

In This Issue—*Factory Service Managers' Convention*

MAY 1922

MOTOR AGE

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CHICAGO, MAY 25, 1922

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MOTOR AGE

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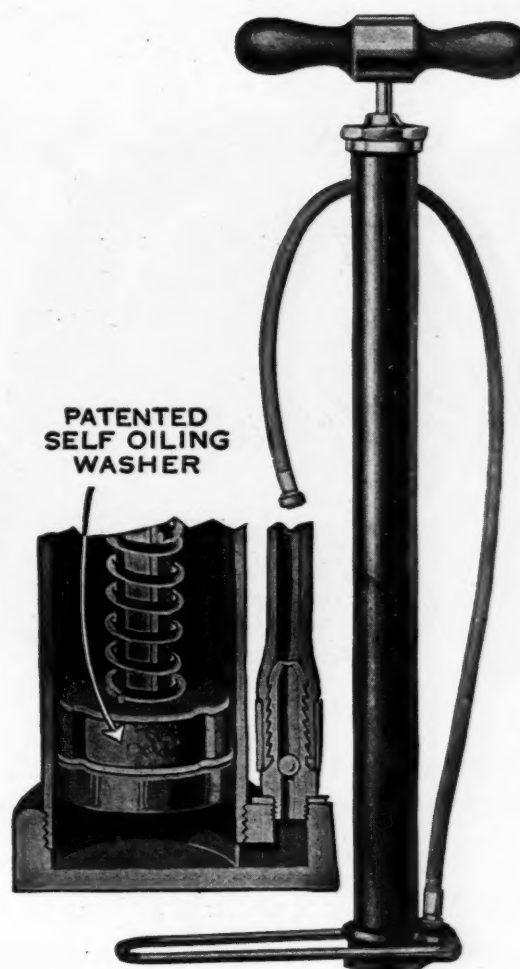
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MILWAUKEE TIMER *for* FORDS

MOTOR AGE



N. A. C. C. Service Managers Committee Will Foster Local Association Movement

Factory Service Managers Approve Theory That Men on Firing Line Should be Organized as a Means for Educational Work—Flat Rate Up Again

By CLYDE JENNINGS

Detroit, May 17.

THE movement for the organization of local service associations was given a distinct impetus here today and yesterday. The Service Managers Convention of the National Automobile Chamber of Commerce, which was in session here for two days, approved of the idea of local associations; pledged the assistance of the factory service managers toward such organizations, and applauded the announcement that steps had been taken for the establishment of a speakers' bureau for the assistance of these organizations.

The speakers' bureau will follow closely the idea that was developed somewhat by the National Automobile Dealers' Association some months ago and which conducted the "Service Chautauqua" for a long enough period to demonstrate that the plan was effective.

The plan, as outlined by Harry Cobleigh, secretary of the Service Committee of the National Chamber, will obtain from the factories and parts manufacturers the names of service representatives who will appear before the local associations at their regular meetings

to explain engineering and service problems of the particular unit they represent.

Assistance in Organizing Local Associations

Also it was announced that Cobleigh will shortly make a trip through certain sections of the country to assist in organizing local associations and to revive the interest in those associations that have not been operating satisfactorily. This announcement was received enthusiastically and the members of the convention urged that this trip be undertaken at the first possible opportunity. There are about twenty associations now, some of which are not active. It is hoped to have twice this number going at high speed by the time the fall meeting is held.

At this meeting there were three local delegates present—representing the New York, Brooklyn and Syracuse associations. It was the first time that such delegates have been present and they commanded a good deal of attention from the factory service departments.

Exchange of Experiences

The meetings of the factory service managers, for that is what these meetings are, are not sessions where these representatives of the factories meet and agree to do certain things or outline certain practices for the bewilderment and oppression of the men on the firing line, but rather they are meetings where this group of men, working for a similar purpose, gather and discuss frankly the methods that have succeeded or failed with them. There were, probably, as many speakers who told of methods that had not worked out as there were of those who told of satisfactory results.

The object was to enable fellow members to escape the same pitfalls that had annoyed the speaker. It was quite common for a speaker to report "Our method of handling this problem is not working out and we are looking for suggestions," and then to go on with a description of his work. Usually a remedy was suggested, sometimes several. All sessions were presided over by L. C. Voyles of the Nordyke & Marmon Co., chairman of the committee.

There were two parts of the program—the talks of the members of the convention and other speakers. Among the latter were E. S. Jordan, president of the Jordan Motor Car Co.; H. H. Rice, president of the Cadillac Motor Car Co.; O. E. Hunt, chief engineer of the Chevrolet Motor Co.; Don Hastings, Hupmobile distributor in Detroit; Harry G. Moock, formerly general manager of the National Automobile Dealers' Association, now assistant salesmanager of the Hudson Motor Car Co.; Fred Schlueter service manager of the Cadillac Branch in Detroit, and Clyde Jennings, Managing Editor of *MOTOR AGE*. It was notable that the outside speakers apparently thought more of the success of the service managers in their work than did the managers themselves. Each of the speakers told the managers that maintenance of motor vehicles today was a good job and compared well with other maintenance work and that it was because the motor vehicle was setting such an incomparable pace as compared with other means of transportation that the maintenance was expected to do such wonderful things. Each of the speakers also told the managers that their department was the most far-reaching of any connected with the factory.

Duties of Maintenance Department

Jordan dwelt especially upon the importance of maintenance to sales and how serious was the responsibility of assuming the representation of the factory over the long period of time that the owner will use the vehicle. After the engineers, production and sales department had done their best, they put the case in the hands of the maintenance men and awaited the verdict.

Rice spoke especially on the excellence of service as it is today, of the short time in which such a great industry had built up and he expressed confidence that comparison with any other mechanical maintenance would show to the advantage of the motor vehicle maintenance. He also expressed confidence that the present problems would soon be solved.

Lessons Learned from Maintenance

Hunt, speaking from the standpoint of the engineer, said that the service department was the great laboratory of the industry. That it was from the service shops of the country that the engineer must learn what he had accomplished. It is the goal of the engineers, he said, to build a car that will run the full year giving to the careful owner no more trouble than that of supplying gas, water and oil. In order to do this the engineer must have intelligent reports on the cars in the field.

He asked that the service men proceed carefully, not become stampeded on reports of territorial troubles and to educate their representatives to the point where the proper information could be gathered, and then for the service manager to make very sure that this information reached the engineering department.

It was on Moock's suggestion that the Chautauqua plan was announced. He told of the success of this work on the limited scale which the N. A. D. A. conducted it. He said that many of the men to whom appeal must be made to obtain better work on vehicles, had not been trained to read and to these men a word of mouth appeal was the best possible method. The problem of education, according to the speaker, was the biggest now confronting the industry and every available means should be used. After Moock's talk Cobleigh outlined the plan that had already been started.

The Details of the Department

Hastings spoke to considerable length on the methods and detail necessary in handling the maintenance business in a distributor's establishment. He told of the change in practice in the three years that he had been a distributor—often demands for economy of space in the parts department by the increased number of parts and the increase of business, of the changes forced by the increased amount of maintenance and of his working out a flat rate schedule. Hastings is a former engineer and his closely woven description of the fabric of his organization was a surprise to many of the factory service managers.

Schlueter's talk was an amazing story of benefits of the flat rate for the customers and the piece work system in the shop. The speaker told how the total business of the Cadillac Detroit branch maintenance department had been doubled with the same number of mechanical employees; how these men had accepted the piece work schedule without objections and now would refuse to return to the old hourly wage system. This talk was really a story too big to be included in the report of a general meeting and it will later be reported in *MOTOR AGE* in more detail.

Cooperation and the Dealer

Jennings said that the question of cooperation between the various factory departments had a larger meaning than was apparent at the factory, but that the big thing was how this cooperation affected the men on the firing line—the dealer. If cooperation was apparent to the dealer, all well and good, but to give to the dealer the impression that he was serving two masters was fatal. He also reviewed the statistics of the maintenance field to show that this branch of the industry now exceeded that of manufacturing in number of men and capital invested. The goal of the maintenance man should be to out-

Has Your City an Automotive Service Association?

*"To Reduce the Cost and Improve
The Quality of Service"*

A booklet telling the need for them,
the good they can do and how to
form them may be had from the

NATIONAL AUTOMOBILE
CHAMBER OF COMMERCE
366 Madison Ave., New York

Cheaper upkeep will sell more cars

*Sticker prepared by the National Auto-
mobile Chamber of Commerce for
broadcasting propaganda fostering local
service associations*

live the criticism and jokes of today and some day deserve the tribute to his predecessor "The Village Blacksmith."

The most exciting hour of the convention came with the discussion of the flat rate under the leadership of F. A. Bonham of the Durant Motors Corp. It soon became apparent that some factory managers have lost the big idea of the flat rate in an endeavor to work out details that are entirely secondary.

A Variance of Opinion

Some contended that a flat rate be applied to labor only; others that it could not be a flat rate unless parts and materials were included; still others contended that the measurement of a flat rate by time was entirely out of place; that each operation should be measured by a money value and that this value should obtain in every shop in the country, regardless of the local cost of labor, overhead and materials. This discussion was the liveliest of the meeting and as it progressed, several of those who had been the strongest objectors to a simple definition of the flat rate—the average of the cost of an operation in a particular shop—appeared to be softening in their attitude and inclined to accept the theory that as other living expenses were not the same in all parts of the country, even the price of motor vehicles, there was no reason why the price of repair operations should be uniform. This question, which was believed to have been settled last November, appears to have life enough in it to extend over several more meetings.

A Discussion of Parts Business

None of the other general topics on the program aroused the interest as the flat rate. The nearest approach was the topic referring to "pirate parts." As this discussion was opening Cobleigh warned the speakers that the legal definition of a "pirate part" was one "that infringed upon a patent or was sold under misrepresentation as an authorized part." Parts that were sold openly and under a trade mark as replacement parts for an automobile could be referred to as "unauthorized" parts but any reference to a "pirate part" that did not come under the above definition might be construed as slander against the part.

There was no solution offered to the present situation, except that of educating dealers to use more of the original parts because they are the parts that will give to the vehicle the most balanced service, and the pricing of parts to the dealer so that he can make some money while meeting the competition of those who used unauthorized parts. Some of the members of the committee advocated the recognition of the independent maintenance dealer in these prices, giving to such a dealer a discount that would still give to the authorized dealer an advantage in price.

The Independent Maintenance Dealer

A strong sentiment that the independent maintenance dealer is a force that cannot be ignored was developed. Also it was reported that several factories are giving such a maintenance dealer direct recognition in sections where the factory has no dealer. After this independent dealer proves his standard of workmanship, and agrees to carry a small stock of parts, he is given a sign that indicates that he is an authorized service station for the car. It developed that some of these men have made good as salesmen. Usually they work under the nearest dealer. Some of them buy cars for themselves as demonstration cars, but others sell by taking the prospect to the nearest dealer for a demonstration.

This topic became closely woven into that of educating the dealer. No conclusion was reached on this topic, but it appeared to be taken by consent that all methods possible should be used. Several members spoke of their bulletins and Harry Moock suggested a revival of the N. A. D. A. Chautauqua, which will be done in a different way, using the local service associations as a basis of gathering the audience.

Record of Changing Parts

Considerable discussion and descriptions of methods on some of the subjects that are live questions of detail with the factory service departments, as for instance the elimination of confusion caused by changing parts. It is sufficient to say

here that some service managers admit that they have some difficulties in learning exactly when such changes, especially minor ones, occur and that they are puzzled as to how to convey this information to their dealers in a way that will be quite clear to the dealers and permit him to keep the proper record of such changes.

Another trouble of the service managers was that frequently they had no voice in such changes and were often puzzled to find a way in which a new part could be made to properly replace the old with the facilities in the hands of the dealer. One member said that he had often found that the engineering department had worked the replacement feature out as a first step and then had neglected to pass the information along. All of the members agreed that it was an excellent plan to require the engineering department to submit replacement ideas when they submitted a change for a minor part.

Service and Sales One Department

The subject of co-operation between factory and sales departments brought out some diversified practice. In some cases in factories the service department ranks with sales, production and other departments in importance; in some the service is a part of the sales department and in still others it is under the sales department. Judging by the reports made to the meeting, the happiest solution is to make service and sales one department.

As a last feature of the meeting came a discussion as to meetings. Those present were practically unanimous in the decision that the meetings should continue to be held twice a year and that one meeting should be held each year in Detroit. The other meeting will be held in another city and there was considerable sentiment in favor of Chicago for the next November meeting. These questions will be finally settled by a mail vote of members of the committee.

A written suggestion by Stewart McDonald, president of the Moon Motor Car Co., that the name of the committee be changed to maintenance was read. Attention was called to the fact that a number of factories have a maintenance department which cares for buildings and plant and that such a change could not be made in these factories.

GASOLINE DRIVEN RAIL CAR OPERATING FIGURES

Recent experiments with gasoline-driven cars and comparative costs of operation of this form of equipment and steam trains hold out the hope that passenger service now conducted at a loss on about 50,000 miles of American railroads may be turned to a profit. Including 25,000 miles of short lines and 25,000 miles of branch lines of Class 1 roads, to both of which this sort of equipment is especially adapted, about 19 per cent of the country's mileage lends itself to the change.

The first thing the motor car does is to reduce the number of the crew by half. As the wages of engineers and motor-men are influenced in part by "weight on drivers," the actual pay is reduced under the minimum classification.

Pittsburg & Shawmut has two motor cars in operation—one out of Brookville on a 98-mile run and one out of Kittanning on an 83-mile run. The wages of the crew on these runs are respectively 17½ cents and 22½ cents a train-mile. The cars average 6.8 miles a gallon of gasoline.

According to Dwight C. Morgan, vice president, in a statement to "Railway Age," the total cost of operation, including wages, materials and supplies, fuel and four per cent depreciation, amounts to 35 cents a mile. The cost of operation of light steam equipment, based on the same method of ascertaining costs, is 71 cents a mile, or more than double.

A HISTORY OF VEHICLES

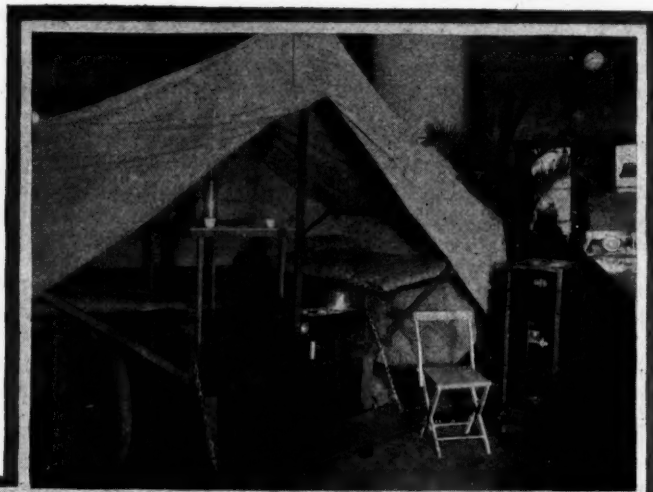
"The World on Wheels" is the title of a new book to be published soon by H. O. Duncan, the author, who has reviewed the progress of vehicles since the days of chariots to the present motor car.

Mr. Duncan has avoided technicalities in discussing the evolution of vehicular transportation, and has spent eight years in preparation of the volume. The automobile industry from its pioneer stages in all countries to its present position is reviewed.

These Pictures Tell Why the Department Store Can Successfully Sell Accessories



One reason; merchandise orderly arranged in spotless cases making selection easy

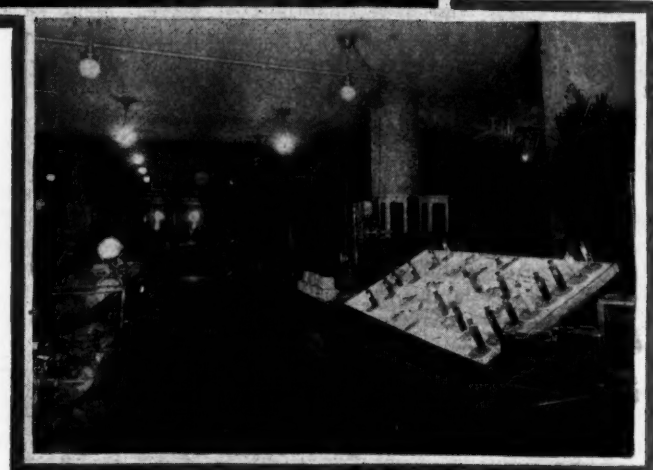
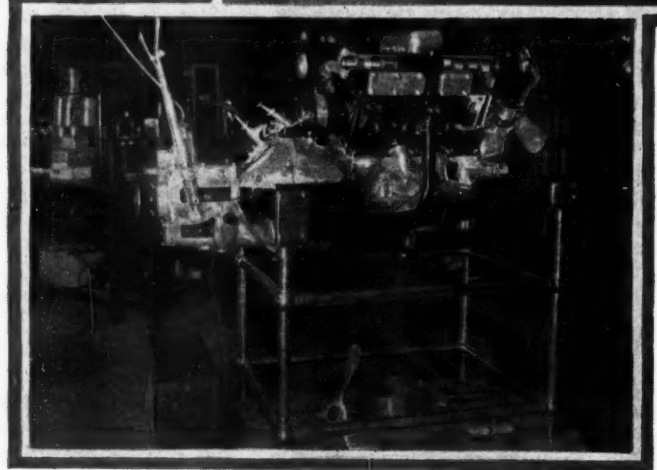


Touring equipment carefully arranged awakened a latent impulse in the onlooker

A tire wrapping machine added a touch of interest that made the casual visit worth while



Even something so inanimate as soap cans may be displayed to excite interest.



THE large department stores are successful merchandisers admittedly or they wouldn't be large. They follow certain fundamental principles of sales science—which is really only common sense, so don't be afraid to tackle it because of the high sounding name—and business results just as surely as the working out of a natural law. They put their merchandise in clean surroundings where people can see it without effort, employ courteous sales people to help the customer select what he needs and to make suggestions; it is all a process of "Ask 'Em to Buy," whether spoken or implied. There are many opportunities for increased sales by dealers if they will but emulate these methods.

Once a year Marshall Field & Co., Chicago, puts on what it terms its "show" in the automobile accessory department to stimulate sales. This year sixteen outside concerns were represented, displaying products varying from an eight-cylinder engine to mechanic's hand soap. The exhibits were neatly arranged and each article made by the sixteen concerns represented was demonstrated by a factory representative. Much interest was lent to the show by such exhibits as the tire-wrapping machine and the Wills-Sainte Claire engine. Educational exhibits were to be found also, one large oil company displaying a chart showing the refining of lubricating oil from the crude to the finished product.

A New Vision of Highways and Highway Transport

All Friends of Good Roads Promotion Are Interested in New Financing Thought of the Chief of the Bureau of Roads

By JAMES DALTON

Washington, May 19.

TWO long forward strides in relation to highway transport were taken at the annual convention of the Chamber of Commerce of the United States which closed here yesterday. In order of their importance, they were:

Enunciation by Thomas H. MacDonald, chief of the Bureau of Public Roads, of a new policy for the financing of highway construction and maintenance.

The fact that a highway transport group was set up within the division of transportation and communication and an entire session devoted to consideration of the newest means of communication.

These two developments, taken together, mark the opening of a new chapter in the development of the motor vehicle. MacDonald speaks with the authority of the Federal government behind him, and he is recognized as the foremost advocate of highway development.

Influence of United States Chamber of Commerce

The Chamber of Commerce of the United States represents business in the broadest sense. Its membership includes hundreds of individual Chambers of Commerce in every city of importance in the country, as well as hundreds of other trade and commercial organizations. Any message sent out by it carries tremendous weight. Inclusion of highway transport on the agenda of the convention was a distinct concession, for it was one of the few purely American questions considered. Practically the entire program was devoted to a discussion of the effect of European problems upon American business.

Evidence of the importance attached by MacDonald to his statements was found in the fact that he declared before he began that he did not propose to depart from his prepared address, because he did not want his statements garbled. His declarations on this occasion were preliminary to a conference next week with representatives of the automotive industry and the National Association of State Highway Officials. Adoption of a nation-wide policy of financing and regulation will be taken up at the meeting May 24, which will be held behind closed doors.

Translated into the simplest terms, the contention of MacDonald is that the original cost of highways should be a capital charge against all the property which will be benefitted by them, while the rental, or maintenance costs, should be paid by the users of the roads.

Road Types to Suit Locality

As a corollary, he believes careful attention should be given the transport needs of each locality before the type of highway is determined. When a gravel road will carry all the traffic likely to develop, that is the type which should be built. In other words, there should be enough vehicle traffic to make the road self-supporting from the start. Maintenance, MacDonald declares, should begin the day the road is thrown open. If that is done, there need be little fear of destruction. The type of surface can be changed as traffic increases.

Leaders of thought within the automotive industry have arrived at the conclusion that so long as attention is concentrated exclusively upon the production and sale of motor vehicles, the industry is building upon a foundation of sand.

They feel that motor transport is in its infancy, provided highways are developed upon a systematic basis, but that unless this is done they will find themselves with a tremendous amount of highway rolling stock with nothing upon which to roll it.

Agricultural interests are exerting a greater political influence in this country than ever before, and the sentiment of the farmers is crystallizing against the building of anything except what they term "farm to market" roads. They have been led to believe that motor vehicle users are concerned chiefly with the construction of great transcontinental highways, many inches deep with cement, on which they can speed from the Atlantic to the Pacific and from one resort to another.

This feeling, unless it is controverted by constructive action, will have a tremendously adverse effect upon Federal and state aid for the building of good roads carefully thought out in trunk line systems. The farmers will insist upon having the greater part of this money spent upon the construction of highways which will enable them to get their produce to market most easily and expeditiously.

Develop Farm to Market Roads

Deep students of highway building realize that the animosity of taxpayers against good roads must be dispelled, and that farm to market roads must reach every corner of the land if motor transport is to have its full development. The importance of MacDonald's opening gun in the campaign is therefore evident. He considers a sound financial policy more important at this time than the regulation of motor vehicles. Even Federal regulation of post road transport is not yet practical, he feels.

When asked recently by the House committee on roads what he thought should be done to regulate motor traffic, he said:

"In my judgment, we might arrive at a fair taxing of motor trucks employed in commercial trucking by licensing companies to operate over a fixed route on a fixed schedule, with a responsibility to the public for the property which they undertake to transport and also for any injury which they might cause to the traveling public."

MacDonald's views on the regulation of motor vehicles are similar to those of E. J. Mehren, editor of the Engineering News-Record, another speaker before the highway transport group at the convention here. The cardinal points outlined by Mehren were:

1. That regulation should be encouraging to highway transport, and not punitive.
2. That it should protect the rights of road users and prevent abuses.
3. That there should be a minimum of regulation consistent with maximum economic use of the road.
4. That there should be rigid enforcement of motor vehicle laws.
5. That it is desirable, when the traffic warrants, that highway carriers engaged in regular transport service be

designated and treated as common carriers and be subjected to common carrier regulation, to the end

- a. That the public may be better served, and
- b. That the business of highway transport may be stabilized.

6. That common carrier regulations, where adopted, should not be punitive, but should permit highway transport to develop its own inherent economies and particularly that it be not artificially penalized and handicapped in favor of competitive forms of transportation.

The meeting of the highway transport group brought out practically all the automotive men in attendance at the convention. They included Alfred H. Swayne, vice-president of the General Motors Corp.; F. A. Seiberling, president of the Seiberling Rubber Co.; F. C. Van Cleaf of the B. F. Goodrich Co.; Alfred Reeves, J. M. Marvin and Pyke Johnson of the National Automobile Chamber of Commerce; M. L. Heminway, general manager of the Motor and Accessory Manufacturers Association, and A. L. Viles, general manager of the Rubber Association of America.

A. J. Brosseau, president of Mack Trucks, Inc., and a director of the Chamber of Commerce of the United States, as well as of the N. A. C. C., presided. He has long been a student of highway economics and he stressed the importance of the meeting in his opening remarks. It was his thought that any message from the United States Chamber would carry great weight throughout the country.

Transportation Governs Future of Nation

The first speaker was MacDonald. Among the points he made were the following:

"The whole future of our nation will be largely modified and determined by the factor of transportation in the sense of covering all forms of interchange.

"There are no precedents from which we may accurately estimate the cost of providing the necessary improved highways, but the financial aspects even now are such as to demand the most careful and scientific policies which may be determined. As the costs accumulate from year to year, the increasing demands upon the financial foundation will cause failure unless the governing policies are properly determined and planned for that future.

"No reason can be offered not to plan well for the future, for we are yet near the beginning of highway building activity in its major sense.

"There is plenty of evidence that the tax-paying public is rapidly nearing the end of its ability, or at least its willingness, to act further in the capacity of a shock-absorber. There is no reason why the highways should not be placed in the self-supporting class. They are not a luxury nor an incidental, but one of the indispensable facilities to the life of the nation and the individual in all its phases. The highways are possessed of a real earning capacity, and this must be recognized and admitted.

Highway Earnings Can Be Determined

"There is no difficulty in allocating the earnings of the highway between the different services which it performs. This may be accomplished acceptably by fair and impartial study and investigation. Up to the present, too many such studies have been made for the purpose of determining a predetermined conclusion. All the aspects of highway improvement are so modified by the particular and specific conditions of the locality, small or large, under consideration, that he is wise who will not make either general or dogmatic assertions.

"Many of these assertions which have been accepted as almost axiomatic fall down as soon as examined in the light of real facts. For example, it has been accepted as a to-be-rigorously observed tenet that highway bonds shall be issued for a shorter period than the life of the road.

Maintenance Begins When Road Is Opened

"Again, suppose that capital is borrowed to establish a business. * * * Is it an evidence of unsound financing that the owner has continued to carry the original investment, using his earnings to maintain and to increase the value of the plant by enlargements and betterments?

"The term 'permanent roads' is a fallacy which is respon-

sible for more or less of the unsound theory which has been advanced with reference to bond issues. There are certain of the essentials of road construction that can be so built that the deterioration is so slow that they may be properly termed permanent. Road surfaces of whatever type deteriorate. Maintenance should begin as soon as the surface is thrown open to traffic, and the higher the cost of the road, the more careful in detail should be the maintenance.

"There is also the fallacy of the imposition of detailed and arbitrary legal limitations upon the character and weight of the loads which shall use the roads. Proper regulation within certain reasonable legal limits of the use of the roads is an administrative matter and should be so regarded. Even in a single state conditions vary to the extent that loadings which may be carried without deterioration of some road surfaces will inflict untold damage upon others.

"There are many other fallacies which must be cleared away before we can hope to reach sound conclusions as to permanent policies which will justify themselves over a long term of years. Our total expenditures for highway purposes in the United States last year were approximately \$600,000,000. This is the maximum expenditure for one year, but even this rate will not satisfy, within any reasonable period, the demand for improved roads.

"In the development of highway transportation, the individuals composing the public have equipped themselves with rolling stock to the extent of more than 10,000,000 motor vehicles, to say nothing of the large number of horse-drawn vehicles in use, and the public as a whole is charged with the task of providing the roadbed.

Highways Serve All

"There can be no question of the service the highways render to the owner of the motor vehicle privately operated. There can be no question as to the service which is rendered by the highway to operator of motor truck lines and motor bus lines. There can be no question that the improved highway serves the real property in the rural districts. There is, although more questions may be raised, a real service rendered by the rural highway to the property within the urban limits. Or, if more acceptable, to the people as a whole within the cities. * * * All foodstuffs originate upon a highway some place, and the more quickly and directly they can be transported from the point of origin to these people, the cheaper will be the cost and the better will be the quality.

"The relative share of the cost of highways may change, but it is difficult to harmonize with the tenets of fairness and equity any plan of financing which does not distribute some part of the cost to each of these services.

"A proper financial policy cannot be established unless there is functioning an efficient highway administration. This applies regardless of the unit that is under consideration.

"The selection of the type of roadway surface is the all important item from the standpoint of the highway service and highway finance policies. The service to be rendered must determine the selection of the type of highway. * * * The major items of the budget will include maintenance, reconstruction, new construction.

"Reconstruction is included separately from maintenance, for in the progress of highway improvement the replacement of old surfaces is usually by a higher type surface, and consequently the road is improved beyond its first condition.

Care in Fixing Fund

"The new construction requirements in the majority of the states are capable of absorbing all the funds that can be made available, so that it is in the fixing of this fund that the most care should be exercised. * * *

"It is believed that a proper financial policy will require first, that all of the maintenance funds be met from the revenues derived from the road user; second, that the costs of reconstruction be met from the revenues derived from both the road user and from state taxes, the relative percentages being different for different states and for the different types of roadways built; third, after deducting the Federal aid, the cost of new construction should be divided between the road

"What Is the Earning Capacity of a Highway?"

users and other state taxes from both urban and rural sources.

"Just how the respective revenues for reconstruction and new construction shall be divided between revenues, from the road users and other classes of revenue, and how these costs, once apportioned, shall be divided to the several classes of road users and the different classes contributing to the other revenues, must be determined by the most thorough research and investigation, and there are many facts which must be given consideration. It has been stated that the total expenditures for the past year were approximately \$600,000,000. Federal aid and motor vehicle revenues constituted 33 per cent; the remaining 67 per cent came from other sources, which are either paid directly or will eventually be paid by state and local taxes. It is believed that a very considerable readjustment of these sources of revenues must be made, so that a larger percentage will be paid by the road user and a lesser percentage from state or local taxes. It must be remembered that this statement is not fairly representative of the funds collected directly or indirectly from the automotive vehicles, for our estimates show the following revenues paid during the fiscal year 1921:

"Federal taxes paid by manufacturers on passenger cars and motor trucks.....	\$115,546,249
State registration fees.....	112,478,654
Personal property taxes.....	52,500,000
Wheel and privilege license.....	3,636,543
Gasoline tax, 17 states, calendar year 1922, estimated.....	11,000,000

"A total of \$305,161,146, or approximately \$30 for each car and truck registered during 1921. This total sum, it will be noted, amounts to over one-half of the total estimated road expenditure for 1921.

Determining Limitations of Highway Transport

"It will be noted that little has been said as to the uses which are to be made of the highways. It must be remembered that the whole question of highway transportation is in its infant stages. Very careful investigations and studies are now going forward to determine the economic limitations of highway transport, which includes the necessarily adjusted highway construction. We have made rapid progress during the past two years toward such determination, and the suggestions which have been made are based upon an administration of a highway program predicated upon the results and determinations of these scientific researches and investigations. The objective, after all, is to furnish the cheapest possible highway transportation, which involves both the rolling stock and the roadbed."

Mehren followed MacDonald, taking a highly sympathetic view of the indispensable service rendered the public by motor vehicles. His subject was "Practical Highway Transport Regulation," and he argued for sane rules to govern operation.

"There is need right now," he said, "for a new consideration by both interested and impartial parties of the present laws, to the end that there may be prepared for the meetings of the legislatures next winter sound consideration as to the present statutes and the desirable lines of revision."

Regulation of Motor Vehicle Transport

Mehren said it was possible to make a strong theoretical case against regulation of motor vehicles as common carriers, arguing that there are sharp differences between motor vehicle transportation and that of steam and electric railroads. The investment in other types of carriers is stable and competition is difficult.

He asserted, however, that the public has determined that common carrier regulation is necessary and that where motor transport is heavy the public is better served by regulated service. He added that regulation offers the possibility of stabilizing the highway transport business by saving it from the destructiveness of uninformed, fly-by-night competition.

"Obviously," he said, "sound economic demand that we allow each type of transport to develop its utmost economies and find its place in the transport system in accordance with the advantages it offers the public. If an earlier form of transport suffers thereby, it cannot be helped.

"Naturally, the motor vehicle engaged in common carrier service must pay for the use of the road, just as a privately owned and operated vehicle does. A tax graded by extent of the use of the road is the preferable one, and where that does not exist a somewhat higher tax on the common carrier is warranted, because of the certainty of greater use of the road. The common carrier must expect to pay a franchise tax."

Varied Opinion on Highway Types

In the discussion which followed, representatives of brick and cement interests contended that there was no such thing as building too good a highway for any particular district, and that heavy traffic always followed a good road. Exception was taken to this contention by Van Cleef, Seiberling, Henry D. Shirley, chief of the Good Roads Board of the American Automobile Association, and MacDonald. They asserted that gravel surfaces often were adequate for farm to market highways.

MacDonald inquired pertinently, "What is the earning capacity of a highway?" He indicated strongly that this would be one of the cardinal points in his creed by asserting that it does make a great difference where good roads are built and that the railroads have learned this lesson.

W. K. Hatt of the National Research Council declared that the day of opinions in highway building has gone by and that construction in the future must be based on a scientific basis. He deprecated the number of organizations engaged in highway work, declaring there was duplication of effort and lack of purpose.

The Duty of Every Man

The purport of the entire meeting was that tremendously important developments are pending in relation to highways and that the time has come for every man in the automotive industry to study the question from a broad gage viewpoint if the future of his business is to be assured. This applies not only to the manufacturer, but to the distributor and dealer as well as to the operators of trucks and passenger cars.

Study of the highway transport question has just begun. Its importance as a factor in the industrial life of the nation has been recognized by the Federal government, by Congress and by the most important business organizations in the country. Further conferences will be held in Washington, and a definite program will be mapped out, in which all elements concerned in the building of highways and in the operation of motor vehicles can reconcile their viewpoints.

While it is conceded that motor transport is in its infancy, this fact stands out:

The railroads of the country paid approximately \$276,000,000 in taxes in 1921 upon an estimated valuation of \$19,000,000,000.

The motor vehicles of the country paid approximately \$262,000,000 in taxes in 1921 upon an estimated valuation of \$9,000,000,000.

The automotive industry failed in its efforts to elect C. E. Kettering, W. O. Rutherford and J. Walter Drake to the directorate of the United States Chamber. The reason was that there were too many candidates from the Sixth district, in which all of them reside.

The N. A. C. C. failed also to have the chamber adopt specific resolutions protesting against the reimportation of motor vehicles sold by the government in foreign countries the repeal of war excise taxes and an endorsement of Federal aid in highway construction. The position taken in refusing to adopt the resolutions specifically was that the chamber already had gone on record in favor of them in the broadest sense, and nothing was to be gained by reiterating its attitude.

RENEWING CYLINDERS

SOME Data on An Important Phase of Automotive Maintenance—An Operation That Involves a New and High Standard of Craftsmanship and Unusual Materials and Equipment

Part II—Parts Machining and Fitting

By PAUL DUMAS

TO adequately take care of the heat concentrated on the head of the piston, it is generally made of greater thickness at that point. Being the hottest, it will naturally expand a greater distance than any other part of the piston at any given temperature. It is because of the above reasons that pistons are always relieved or made smaller at the top.

The clearances allowed here are called the land clearances and are vitally important to the successful operation of the pistons. The stresses distributed on the piston pin bosses when the piston pin is under greatest pressure may tend to cause a distortion in the piston in the vicinity of the piston bosses. It is for this reason and to reduce friction that many pistons are relieved for a considerable distance on the outside wall surrounding the piston pin. Conversation with representatives of large replacement piston manufacturers brings forth some interesting facts concerning the causes of the majority of piston failures, in engines to which oversize pistons were fitted.

In most cases the failures were traceable to improper finishing methods or to improper clearance allowances. Cast iron pistons in successful operation today are so thin that the pressure of a hand squeeze will throw them out of round. The method used in holding the old style heavy walled piston cannot be profitably employed on the present day thin walled type. The utmost delicacy in handling is necessary if a successful job is desired.

Smooth Cone Now Practically Obsolete

The old method was to hold the piston against a smooth cone during the final turning and grinding operations but the up-to-date shops have abandoned this method for obvious reasons. To facilitate the final finishing operations on a semi-finished piston the large piston manufacturers machine the surfaces by which the piston is to be held. These surfaces should be used as the datum points for all subsequent operations on the pistons.

The head of the piston is left with a slight boss, the end of which has been provided with a tapered hole for centering the piston at that end. The bottom of the piston and the inside of the piston skirt near the bottom have been machined with true faces. The view of the piston showing these points is shown in Fig. 7. A cone with a multiple of steps on its face which al-

lows for grinding wheel clearance is the device now used for centering the piston.

The rod shown in Fig. 8 is threaded at one end and when the piston is placed on the cone a dummy piston pin is inserted through the piston pin bosses and through the eye of the rod. The rod is then pulled backwards by the pressure of the hand nut at its opposite end and the piston is drawn securely against the cone, and the piston is ready to be finished turned. If the steps on the cone will not exactly fit the skirt inside diameter of the piston it should be chucked in an accurate chuck where the skirt inside diameter can be bored out to a diameter large enough to accommodate one of the steps on the cone fitting. This operation is illustrated in Fig. 9.

With the piston thus held securely the grooves are turned to the finish size and the outside diameter is brought down by turning to the point where there is only enough stock left for grinding.

Piston Finishing Operation

In some shops the head of the piston is finished at this setting and the boss on the head which was used for rough turning the piston is removed in the machining process. There is left enough of the center hole, if the boss is to be removed at this setting, to provide a center hole for holding the piston when it is given the final grinding. The other method is to face off as much as possible from the piston head but leave enough of the boss to allow for holding on the subsequent operations. In cases where this procedure is followed it is customary to remove the boss and face the top of piston as the final operation on the piston.

The turning operations having been completed, the piston is then brought to the external grinder where it is reduced to the desired diameter by the cutting action of the grinding wheel which also imparts to the piston the necessary smooth finish. The grinding operation in all cases is substantially similar, the only difference being in the method of mounting

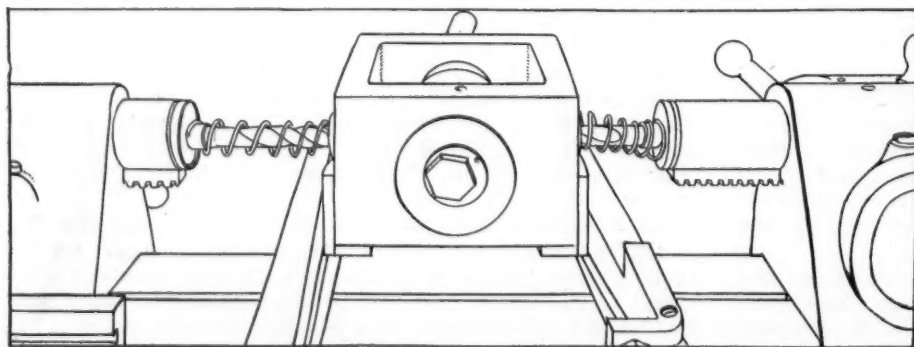


Fig. 6—Piston boss drilling jig as used by a large manufacturer of pistons.



Fig. 7—The datum points on a semi-finished piston. All finish machine operations are based on the location of these surfaces.

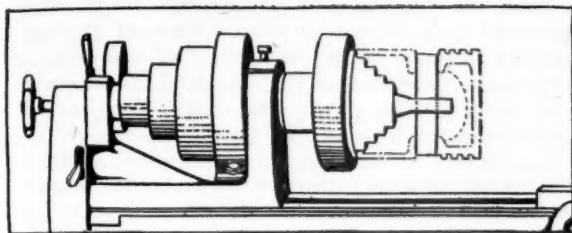


Fig. 8—A piston mounted on step cone fitting for finish turning. The open end of the piston is drawn up against the removable cone rings by pressure of the dummy piston pin applied by the hand nut shown at the extreme left.

Fig. 9—Enlarging the skirt inside surface to bring it to a size that will exactly fit one of the removable step rings. The removable step rings referred to in the first installment are used on the first turning and grinding operations. Fig. 10 shows the piston receiving its finish turning operation.

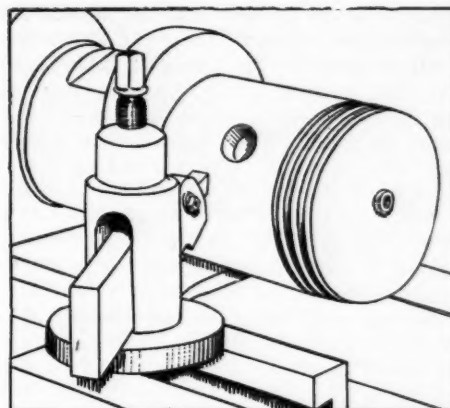
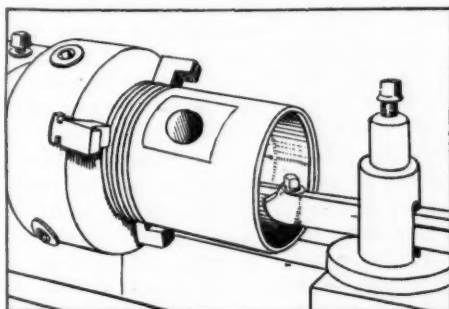


Fig. 10—Piston receiving the finish turning operations. At this setting the outside diameter is brought to size for grinding, the head is finish faced and the ring grooves are finish turned.

the piston for the operation which differs in the various grinding machines. A representative fixture for holding the piston is shown in Fig. 11.

Fixtures of this type are necessary to secure accuracy. The fixture illustrated is so constructed that the step cone effect is secured through fitting removable rings to the main holder. These rings hold the piston on two faces as will be seen by examining their construction. This provides a continuous contact and is the method in almost universal use in the factories and large regrinding shops throughout the country. With this construction the driving of the piston is taken through the piston pin bosses through the medium of a dummy piston pin.

To meet the demand for a suitable universal jig or holder, some of the manufacturers of grinding machines and replacement pistons are developing suitable devices. A fixture produced by one of the makers of grinding machines is shown in Fig. 12.

There are still a few establishments that apparently have not been awakened to the inefficiency of the old method and these same concerns are encountering considerable trouble with light weight pistons which in most every case can be traced to the machining operation. If these principles of piston jig construction are followed by the small regrinding shop it will be enabled to produce a finished piston from the semi-finished state that will be concentric and which will have a uniform wall thickness which is one of the necessities to secure uniform expansion or freedom from distortion under heat.

By following this method, a piston that has been ground but which does not exactly fit the particular bore to which it is to be fitted, can be rechucked in the same position as it was at the first grinding, and a cut as small as .001 can be taken which would be practically impossible with the smooth cone method.

This being the final machining operation on the piston, it is imperative that the operator not forget to relieve the pistons at the ring lands. This is perhaps the most important item in the prevention of scored cylinders and piston seizure. The

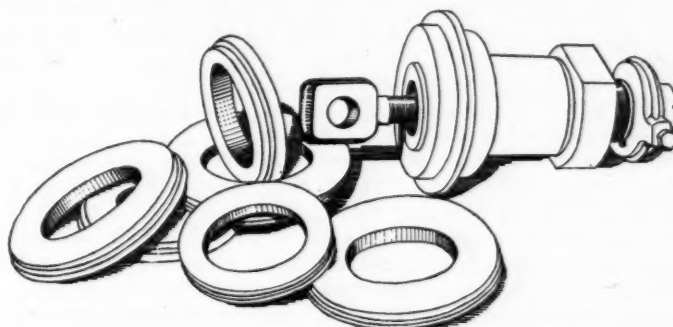


Fig. 11—A typical fitting for grinding pistons. The removable step rings so often referred to in the text are shown. In this particular case the fitting is used for grinding between dead centers.

table given below is an average of the values of this clearance or relief for various diameter cylinders.

Cylinder Diam. in inches	First ring land	Second and third ring land	Fourth ring land
3.0	.0075	.005	.032
3.5	.0085	.006	.032
4.0	.010	.007	.032
4.5	.0115	.008	.032
5.0	.0125	.009	.032

The above data refers to the fitting of cast iron pistons; the same table may be applied for aluminum alloy pistons, in which case the clearances should be doubled. It might be well to add that clearance means the difference between the inside

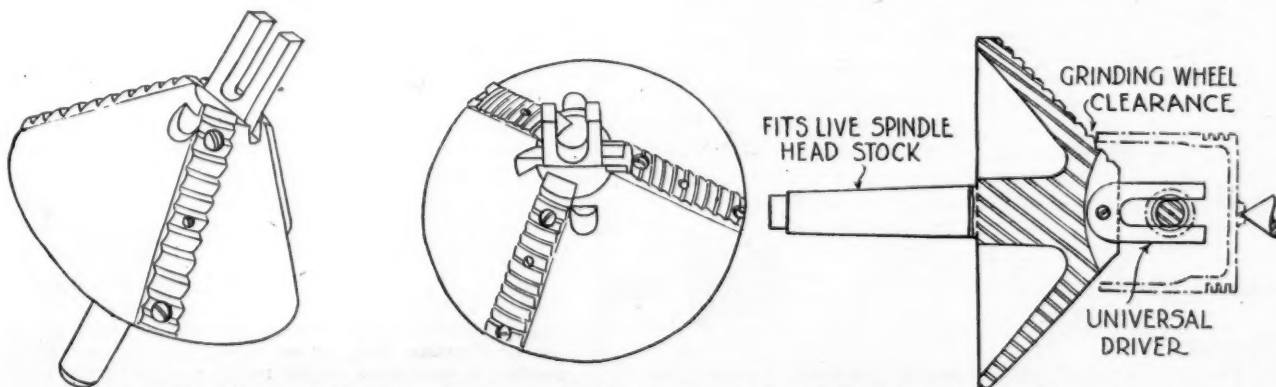


Fig. 12—A grinding fixture being marketed by a prominent grinding machine manufacturer.

diameter of the cylinder and the outside diameter of the piston, measured at the point where the clearance value is designated. It will be noted in the foregoing table that the fourth or lowest ring land is given more clearance than the first or top land, and that the value remains practically constant regardless of piston diameter. This clearance is allowed where the lower ring acts as an oil scraper, and in some cases a groove or bevel is cut below the lower ring to assist the scraper effect of the ring. A series of small holes is often drilled in the lower ring relief or groove, which aid in the return of the scraped oil to the crankcase. The relief is not allowed to compensate for heat expansion.

The next steps necessary to complete the semi-finished piston are reaming the piston pin bosses and fitting the piston pins and rings. A good expansion reamer is the best tool for reaming the bosses. It may be power driven or hand driven. In cases where no power drive is used on the reamer the piston and not the reamer should be rotated. The clearance between piston pin and bearing should be not less than .0005 and not more than .001 for the average size bearing. The sense of feel of the fitter is usually depended on to determine when a pin is properly fitted. If the piston is held in the hand, the weight of the big end of the connecting rod should permit the rod to fall of itself if proper clearance has been allowed.

The pistons of some engines provide all of the piston pin bearing surface in the connecting rod. In such installations the pin is anchored in the piston and does not rotate. The pin in this case should be a light tapping fit in the piston boss. The generally accepted over sizes for piston pins are .003, .005, .008 and .010 and to facilitate identification of the various over sizes they are given a daub of paint on their ends. The color of this paint is a mark of the over size of the pin and the scheme is as follows: .008 over size white, .005 over size yellow, and .003 over size red.

Excellent service to grinding shops is furnished by the makers of replacement piston pins, so that ordinarily the shop is not called upon to construct them.

A good piston pin is usually made either from thick-walled, seamless steel tubing, or from solid stock possessing the same physical characteristics. The Society of Automotive Engineers has standardized certain steel specifications which are suitable for the manufacture of piston pins. Heat treatment is necessary to produce the necessary hard shell which is required to resist wear but the hardening process should be only deep enough to offer a hard exterior surface for service as a bearing whilst the remainder should be comparatively soft and tough.

Function of Piston Ring

The heat treatment recommended for piston pins should coincide approximately with the S. A. E. heat treatment "B." Generally speaking the average small regrounding shop should not attempt the manufacture of piston pins except in emergency cases. This statement is made because of the fact that ordinarily the cost will run much higher than the cost of the same pin from a piston pin manufacturer.

The function of a piston ring is to provide a seal between piston and cylinder wall with a minimum of wall friction. To

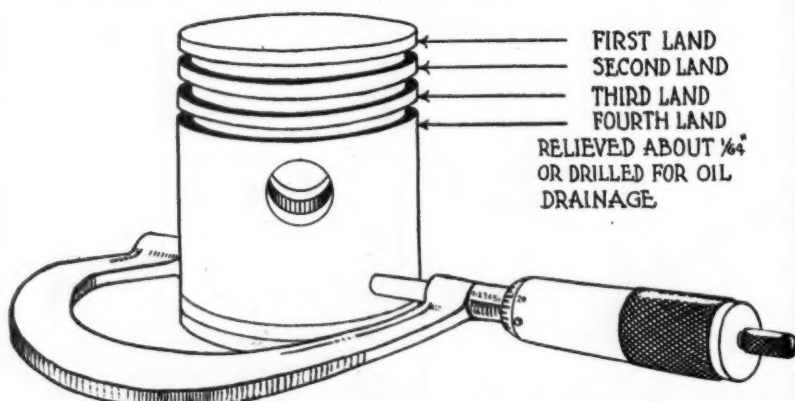


Fig. 13—The diameter of the piston at the ring lands is always the smallest diameter of the piston. On some pistons the bottom land is smaller than the top land to provide oil clearance

secure this effect the ring must be constructed of the best materials, properly heat treated to relieve internal stresses. The workmanship must be of the highest order and next to the proper selection of materials is perhaps the greatest single factor in determining a good piston ring. Many rings are of special multiple piece construction that present theoretical advantages. These theoretical advantages are sometimes offset by the inability of this type to withstand the practical demands of service in the engine cylinder.

It would be unwise to condemn this type of piston ring indiscriminately because a few of them have convinced the manufacturers of motor vehicles that they do possess some merit and in a few instances are used as factory equipment. A good line of reasoning to follow in the selection of a piston ring is to investigate its trade history. If in doubt, follow the instructions of the manufacturers of the engine.

The fitting of piston rings is an operation that is too well known to require description but a few reminders may prove of some little value. The rings should be a free fit in the ring grooves but not free enough to have a perceptible amount of play. An ideal condition exists where the sides of the rings are lapped to a seat in the grooves. The amount of clearance or gap to allow at the joint in the ring ends depends upon the construction and characteristics of the particular engine, the type of piston and ring used and the diameter of the bore.

A general rule that may be safely followed for engines up to four and one-half in. bore is to allow .001 to .002 per inch of bore diameter, using the higher figure where the engine is of the high compression high speed type or where short water jackets are used. The high figure should be followed where alloy pistons are used. Manufacturers of alloy pistons are uniform in advising against the use of the eccentric ring on an aluminum alloy piston, the reason advanced being that because of the unequal wall pressure the ring will tend to rotate in the ring grooves and cause premature wear.

Top Piston Ring Nearest Combustion Chamber

It is worth remembering when fitting piston rings that the top piston ring is nearest the combustion chamber and consequently gets the hottest. More slot clearance should be allowed on the top ring for this reason. Taking the case of a high speed engine of three and one-half in. bore the top ring should be fitted with not less than .006 when tested with a feeler gage.

The second and third rings should have a slot or gap clearance of not less than .003 and not more than .005. The actual operation of fitting piston rings has not always received the amount of diligence to accuracy that should characterize this very important work. Suffice to say here that only painstaking and intelligent effort will produce results and to attempt to fit rings without the use of precision measuring instruments is to court trouble.

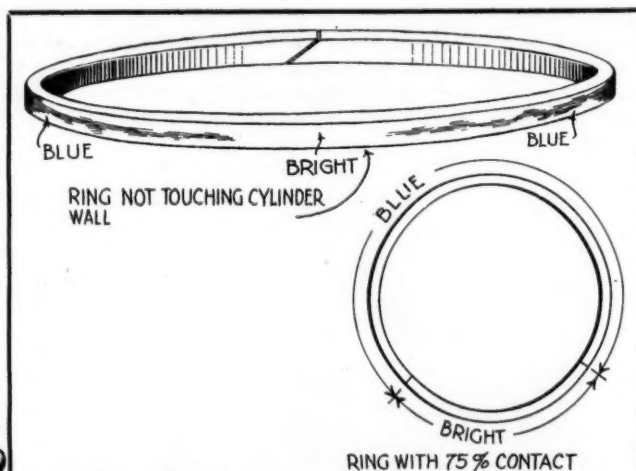


Fig. 14—Testing ring contact on cylinder wall by the use of Prussian blue. This is an accurate and simple method to determine the degree of contact between ring and cylinder.

Manufactures Clearance				
Maker	Finish	Diam.	Clearance	Piston Material
Chalmers	Grind	3 1/4"	0.005	Lynite
Chevrolet	Ream	3.686"	0.003	C.I.
Continental	Grind	3 1/4"	0.001	C.I.
Continental	Grind	3 1/2"	0.002	C.I.
Continental	Grind	3 3/4"	0.002	C.I.
Continental	Grind	4 1/8"	0.002	C.I.
Continental	Grind	4 1/2"	0.002	C.I.
Dodge	Ream	3 7/8"	0.003	C.I.
Franklin	Grind	3 1/4"	{ Taper from 0.003- 0.001 }	Magnalite
Hudson	Grind	3 1/2"	0.0035	C.I.
Hupmobile	Grind	3.248	0.001	C.I.
Kelly-Sp'field	Grind	{ 3.7460 4.4970 }	{ 0.003 0.003 }	{ C.I. C.I. }
Locomobile	Grind	4 1/2"	{ 0.015 0.003 0.004 }	C.I.
Lycoming	Grind	3 1/2"	0.0065	C.I.
Maxwell	Grind	3.622plus	0.013	C.I.
Mitchell	Grind	3 1/4"	0.0025	C.I.
Oakland	Ream	2 1/8"	0.005	Alum.
Oldsmobile	Ream	2 7/8"	0.004	Lynite
Packard	Grind	2.998	0.002	C.I.
Pierce	Grind	4 1/2"	{ 0.002 0.003 }	C.I.

Fig. 15—Sample of clearances allowed by some car manufacturers on 1920 engines. The values given are for the skirt clearance and it should be borne in mind that the ring lands are to be relieved to a diameter .006 to .020 smaller than the cylinder diameter.

The gaging of the slot clearance should be done when the ring is squarely fitted in the cylinder in which it is to run. The piston provides a quick and accurate method for accurately positioning the ring. Place the ring in the cylinder and then insert the piston. Using the head or the bottom (depending on which is the most convenient) of the piston as a stop for the ring, push the ring down until it touches the piston at both sides. This will positively align the piston ring and the feeler gage may then be used to measure the slot clearance. An old piston ring should not be used until the slot clearance has been gaged.

A slight amount of cylinder wear will cause considerable more slot clearance to the ring. Thus if the cylinder is worn .001 of an in. it will cause the slot clearance of the ring to increase from its original value 3.1416 times this amount. This is one of the reasons why the selection of the proper over size of ring for a reground or uniformly worn cylinder requires accurate measurement of the cylinder bore diameter and should not be done haphazardly.

An accurately made piston ring should not require the removal of more than .006 from the ends of the ring in order to secure the proper slot clearance. It is a mistaken idea to fit .020 over size rings to a cylinder that is worn only .010. The result of such practice will be that the ring, although it will have the proper slot clearance, will not bear evenly on the cylinder wall. By filing the ring ends to an excessive amount to enable the over size ring to enter the cylinder the concentricity or circularity of the ring has been destroyed and the ring will have the shape of an egg or ellipse.

Of course, this change of shape will not be visible to the eye but will make itself known through the fact that thousands of miles of running will be necessary before the ring has conformed to the cylinder wall, and in some cases the ring will have passed its stage of usefulness before it has worn into conformity with the cylinder. The fitting of too large a ring accounts for many of the complaints from owners that there is no power in their recently overhauled engines, although new rings were installed.

Generally speaking, 15 hours of running should be sufficient to secure a fair seat on the rings if they have been properly selected as to size and have been properly fitted. The period of caution during which the engine is to be carefully handled should cover the first thousand miles of travel of the car or

the first 35 hours of operation of the engine. The fitting of piston rings that are undersize for the cylinder has effects that are equally as bad.

Checking Up Size

To positively check up on the size of the ring and its fit in the cylinder some of the high grade car service stations, and on racing engines and aircraft engines the ring is tested with Prussian blue in much the same manner as a bearing is tested. It is necessary to test each ring of each piston in this manner. This enables the fitter to determine whether or not the impression left by the Prussian blue covers sufficient area of the ring that it can reasonably be expected to completely seat itself in a few hours of running. An accurately manufactured piston ring of the proper size should show within 80 per cent of a continuous line around the face of the ring without lapping.

Clearances on Alloy Pistons

Many cars use the aluminum alloy piston as factory equipment. The slotted skirt type is an example of the development work done to produce an alloy piston that would not require excessive clearance values when cold. The high co-efficient of expansion of aluminum rendered a loose fit necessary in order that the piston when hot would not expand and seize. The slotted skirt type and the type wherein the skirt is expanded to a semi-elliptical shape by an expander, are so constructed that this tendency towards excessive expansion is either controlled or compensated for.

One maker of the slotted skirt alloy piston recommends that the pistons be fitted with less clearance than would be allowed for cast iron. The pistons referred to are supplied in a finished condition and the lands have been relieved sufficiently at the factory. The skirt clearance allowed is so small that the pistons minus the rings are not supposed to fall by their own weight when placed in a clean dry cylinder. However, the ring lands on these pistons are given approximately double the clearance allowed for cast iron.

Demand Specialized Clearances

The various other alloys as a rule demand special clearances and their installation should not be attempted until the makers recommendation is known. Where aluminum pistons of the solid skirt type are used they require about 100 per cent more clearance than the same sized cast iron piston both at the skirt and at the ring lands. Most pistons are drilled below the bottom ring regardless of the metal used in their construction. This drilling tends to discourage the oil from entering the combustion chamber and the excess oil is allowed to seep back to the crankcase.

As stated in the preceding pages the maintenance of the proper clearances is of the greatest importance in securing a successful grinding job. The average shop will not need to worry a great deal about the piston pin hole being square with the outside walls as the dimensions in this respect have been checked by the firm producing the semi-finished piston. It is a good plan, however, to check up on this point. The standards or recommended clearances of some vehicle and engine makers and the piston material used by them for 1920 is reprinted in Fig. 15. Piston manufacturers in many cases can best tell what clearance should be left for their particular type of piston for any particular installation.

Thickness Gages and Their Uses

Every shop whether large or small should have an assortment of thin metal strips to be used for thickness gages. Some tool companies manufacture these gages, which should have a length of at least five inches.

Nearly all of the gages that are purchased are not sufficiently long and they can be made very cheaply from strips of steel shim stock. They should vary in size from .001 to .010 ins. thickness, should be about 10 ins. in length and 1/4 to 3/8 in. wide, with a pointed end that will permit the strip to be inserted between the gap of the thinnest piston ring.

After the pistons have been finish ground they should be tried in the cylinders before the rings are applied.

The recommended clearance being known, the strip of the

proper thickness is inserted between the piston and cylinder wall. If the cylinder and piston are truly circular the strip can be moved entirely around the piston without any binding or without any looseness. The land clearance can be easily

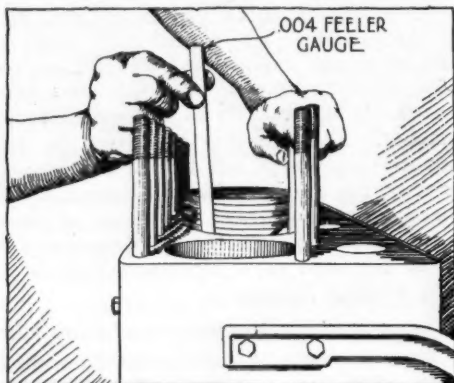


Fig. 16 — Gauging the piston skirt to cylinder clearance by means of a thickness gauge.

checked in the same manner. When fitting the piston rings the gage strip is placed between the ends of the ring while it is squarely in the cylinder and the proper clearance is easily obtained. The two operations described are illustrated in Figs. 16 and 17.

Send Connecting Rods With Block

It is for the best interests of every regrinding shop that they request the owner of the cylinder block to send the connecting rods with the block. Bent connecting rods will undo the finest grinding job and every shop regardless of its size should be equipped with connecting rod alignment and straightening fixtures. No job should be permitted to leave the shop until the rods have been straightened and aligned. This does not mean that every rod will be found to be bent but does mean that every rod should be checked for alignment.

Some large regrinding concerns make a special price on a complete job which includes the refacing of the valve seats, on each regrinding job. In many cases this sort of service has a strong appeal to car owners or small maintenance shops who bring their work to such a shop on the strength of this service.

Scored Cylinder Service

Providing a service that will take care of scored cylinders is another possible means of revenue. This work is done by three or four different patented processes, two of which require that the cylinder be reground after the score has been filled.

These processes are of particular value where the score has been caused by a wrist pin working loose. Sometimes these pins cut so deeply that it would be unsafe to attempt to regrind to a size that would remove the score. By filling in the cuts with the process materials the owner is often times saved the purchase price of a new cylinder block.

Issuing Pamphlets for Advertising

If any printed advertising matter or price lists are distributed, it should contain a few suggestions to the owner such as calling his attention to the fact that cylinder blocks, pistons, connecting rods and piston pins must be sent with each job. The owner should also be informed that he should remove all covers and loose pieces from the block before sending it to be reground and that the cylinder block should also be cleaned of all accumulations of oil and dirt. An effective method of advertising, which to our knowledge has not been used, would be to fasten a small metal plate to each engine block on which would be stamped the firm name and the date of regrinding.

Regrinding Every 40,000 Miles

In closing it might be well to add that the operation of a cylinder grinding machine requires considerable skill and should not be attempted by any one who has had no previous machine shop training. There are no intricate mysteries connected with the process of cylinder grinding, but nothing can replace the skill that is acquired only through experience.

Generally speaking, the engine crankshaft will require grind-

ing probably once every 40,000 miles of operation of a passenger car. The impossibility of arriving at anything near an average mileage is apparent when there exists such a wide diversion in design and materials used in crankshaft and bearings. Some constructions are such that the bearings are so small and the stresses so high that either the bearing or shaft are comparatively short lived.

One of the most prolific causes of crankshaft wear is due to the carelessness of owners or drivers in regard to maintaining the bearings at the proper clearance. A loose main or connecting rod bearing, if allowed to operate for any length of time, will rapidly destroy the circularity of even the hardest crankshaft. Some people do not seem to realize that a comparatively soft babbit bearing can and will pound out a crankshaft if not properly fitted, or if allowed to operate with too much clearance. It is at times difficult to convince the owner of a motor vehicle that chronic loosening of bearings is due to either a sprung or lop sided crankshaft. The economy of having lopsided crankshafts reground can be presented to the owner by explaining and showing that a circular shaft will require less than half the number of hours of labor on the fitting operation.

Crankshafts are reground on machines built especially for that work. The same machine that is used to grind crankshafts, can be used to regrind pistons. Although a machine

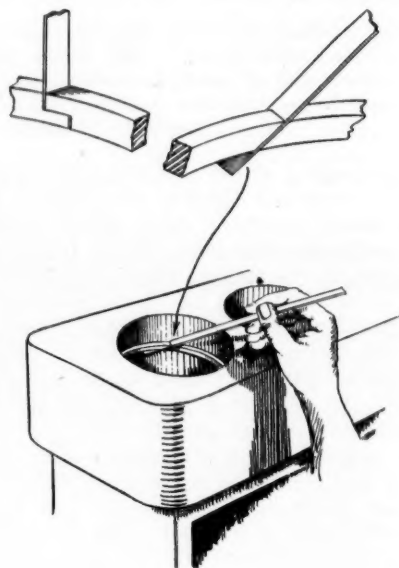
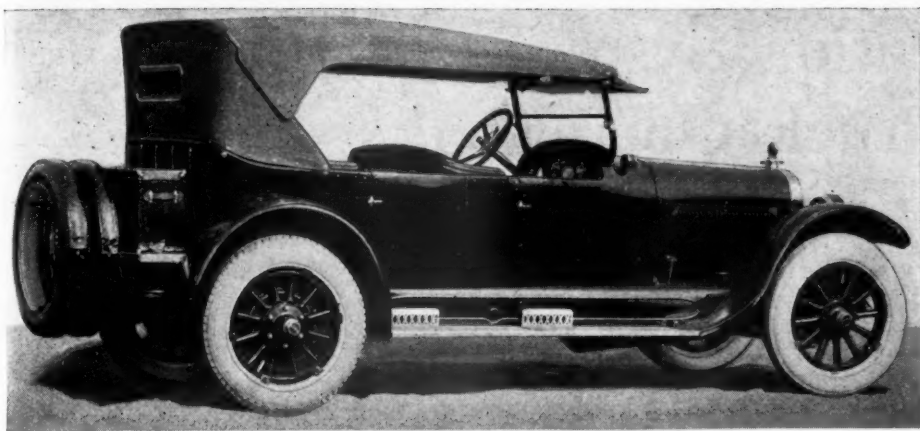


Fig. 17—Determining the recommended ring gap clearance by testing the ring when it is placed in the cylinder. The feeler or thickness gauge is utilized for this operation.

that is efficient as a piston grinder may be too small to handle crankshafts. To accurately grind a crankshaft requires considerably more care than to accurately regrind an engine cylinder. A skilled operator is required because the removal of too much stock from the crankpin or main bearing journal will necessitate the installation of a new set of bearing bushings to accommodate the undersize shaft.

It is hoped that this article has shown the possibilities of cylinder regrinding and cylinder reboring, as a business which is worth the consideration of every up-to-date motor vehicle maintenance institution; that it will cause the discard of the idea held by some individuals that a reground cylinder can never be made as good as a new one, because, generally speaking, the cylinder that has been reground is superior to a new cylinder from the standpoint of performance.

It is possible that this idea has been the result of many reground jobs wherein the pistons were not properly fitted with a consequent poor performance. It may be instrumental in bringing about a better understanding between the parties who do cylinder regrinding and reboring and those who pay them. The necessity of high class workmanship if a high class job is to be done must always be borne in mind. The necessity in this regard of maintaining the proper piston and ring clearances may be of some benefit to the service man at large.



Buick Adds Sport Touring on 6-55 Chassis

THE Buick Sport Touring which has recently been added to the line nominally is a four-passenger car, but has ample space in the tonneau for three people, thus making it possible to carry five-passengers. The body is mounted on the regular 6-55 chassis. Some of the more important features which have been built into this car include a large touring trunk at the rear; snubbers on the front end; drum type head and side lamps; adjustable sun-shade; running board step plates; two piece full ventilating windshield with wiper; glass cover-

ed ignition and lighting switch with push button dash lamp; combination gasoline gage, oil pressure gage and ammeter; combination clock and speedometer; cigar lighter; carpets in both front and rear compartments; walnut steering wheel with walnut control lever knob to match; heavily nicked radiator, guard rails and all other fittings. The car is finished in dark Buick maroon with wheels to match. Tuarc steel wheels to match are optional equipment at an added cost of \$50 if installed at the factory.

ular 5-ton International motor truck. It is lengthened as a unit, not spliced. This feature also applies to the other parts of the chassis.

Limousine Bus Service

TO provide bus transportation between Rochester and Minneapolis, Minn., a deluxe limousine bus has been put into service. It has five compartments separated by glass partitions and provided with individual doors on each side. The chassis is the regular Mack bus type of 216 in. wheelbase and is powered by a 4 x 5 engine developing 35 h. p. at its maximum speed of 1450 r. p. m. Dayton steel wheels are used with demountable rims and Goodyear tires, 36x6 front and 40x8 rear.

The fenders are special close-fitting type. The usual headlights are replaced with a pair of the drum type. The interior of the body is provided with limousine type flush lights throughout.

At the left side of the driver is a signalling device consisting of a nickel-plated arm carrying a red arrow head at its end. This arrow head is illuminated at night. In addition, there are two stop signals at each side at the rear, operated by the foot brake. There is a heavy double bumper at the front provided with hydraulic cushions and the cowl is equipped with a large hatch type ventilator.

Every Call Pays a Profit

"The more calls I make the more cars I'll sell," is the slogan of one Indiana salesman. This salesman has gotten his work down to a scientific basis. He has figured up and found that every call he makes is worth a certain specified amount, this sum being obtained by dividing his commissions for a month by the number of calls he makes. Consequently, he feels that every time he makes a call, whether he sells a car to that individual person or not, he is actually putting a certain definite sum of money into his pocket. This is an idea for other salesmen.



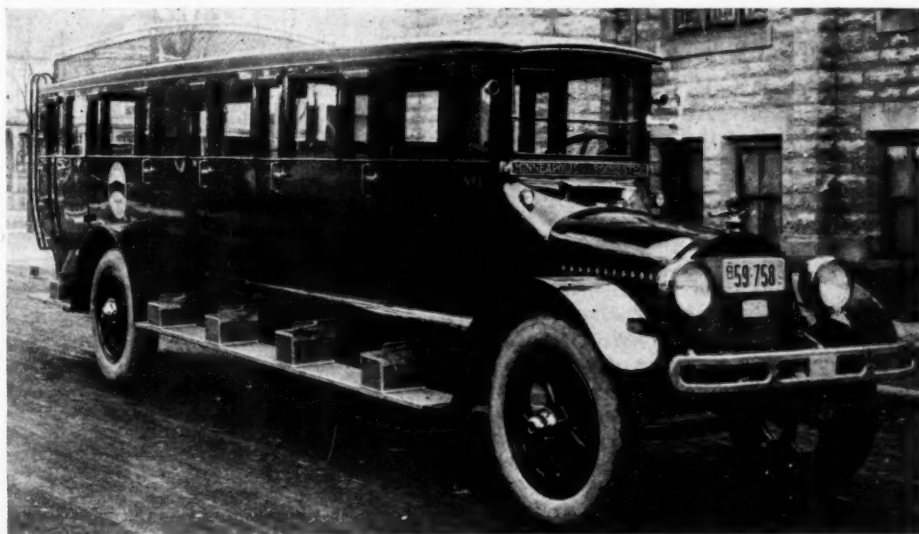
International Buses Have Large Carrying Capacity

THE new International motor bus, six of which recently were delivered to the high school at Modesto, Calif., has a wheelbase of 196 in. and an overall length of 24 ft.

They are equipped with 38 by 7 pneumatic cord truck tires and in spite of their great size, are said to handle as easily as a passenger car. They are capable of a speed of 35 m. p. h. and have a seating capacity of 40 pupils.

The entrance is at the front in direct control of the driver. One large upholstered seat extends across the rear with smaller seats running crosswise. The body is constructed of hardwood with aluminum bindings. Glass panels on the sides are easily adjustable to meet weather conditions.

The same size channel is used in the frame of the bus chassis as on the reg-



Limousine bus body on Mack chassis for service between Rochester and Minneapolis

Good Inspection System Essential In Truck Operation

How One Truck Concern Has Brought Considerable Work Into Its Shop by an Efficient Inspection System. Safety to Workman Important Point

ALTHOUGH motor trucks operate under much more severe conditions, generally speaking, than most passenger cars, the factors governing the servicing of trucks is much the same as it is with the passenger car. The methods of selling the service may differ, but fundamentally the proposition is the same. Where the difference comes in is here: The man who owns a truck will ask first, "How soon can I get the truck?" and second, "How much will it cost?" while the passenger car owner asks, "How much will it cost and when can I get the car?"

With the truck it is highly essential to get it on the road in minimum time, because a truck laid up for any length of time undergoing repairs ceases to be a profitable investment. Therefore, the time element in making repairs to trucks becomes a vital factor. It is just as necessary for the truck maintenance department to tool up for handling repairs quickly as it is for the passenger car service station to do so with the view to giving its customers the benefits of a flat rate system.

The Truck Driver

There is one important factor which must be considered in the maintenance work on trucks, the driver. The owner of a motor car either drives the car or rides in it, while in the majority of cases the driver of a truck is not the owner. The selling of maintenance work on the one hand involves, therefore, the meeting of the owner of the vehicle and in the second, some person other than the owner.

In the first case it is comparatively easy to discuss the work to be done on a car, especially when the owner is aware of the nature of the repairs to be made. With the truck it is different. The owner probably most of the time is entirely unware of any existing mechanical difficulties and with indifference on the part of the operator, a truck might go on running under conditions which soon spell an expensive repair bill.

Anyone who operates a fleet of trucks naturally wants those trucks to operate at minimum expense. A careful oper-

ator will, of course, use his truck carefully, inspect it and make the necessary adjustments at the proper time. He will confer with the owner of the truck or the man directly in charge of the operation of the truck. But what of the careless driver who overloads and over-speeds his trucks and otherwise abuses

sized ultimate repair bill.

By far the better plan of maintaining trucks is to put into effect an inspection system whereby a competent man from the dealer's organization catches the truck unawares and gives it an inspection then and there. This gives an opportunity of studying the load carried,



The engine repair department is located on a balcony. Note the engine stands and the Overhead hoist which not only carries the engines about the shop, but also elevates and lowers them from the floor below. All engines and parts before entering this department are cleaned on the floor below. This insures cleanliness in the shop and better work.

it? He will let a worn unit go on until it breaks and not think of maintenance until the truck is stalled on the road, probably with a load that means a direct loss to someone unless delivered on time.

The concerns which sell trucks now are giving much attention to regular inspection of the trucks they have sold.

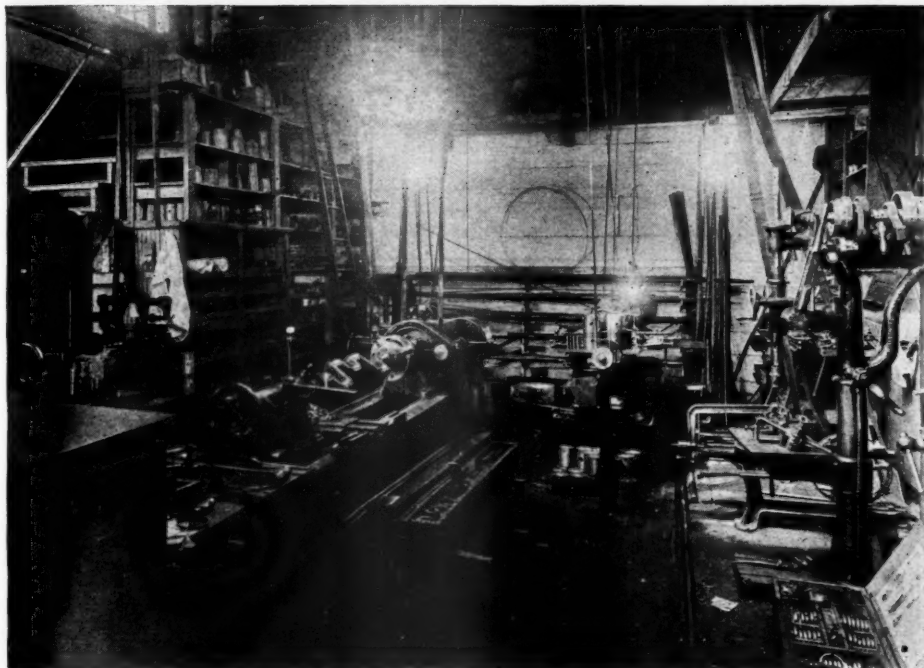
Inspection While in Use

This does not mean necessarily that they write the truck owner a letter and ask him to bring the truck in for inspection. No. Invariably the driver of the truck is consulted and he says "She's going all right." So the invitation of the maintenance department is ignored and the truck goes on its way, all the time slowly but surely piling up a good

general condition of truck and manner in which driver handles it.

Such a system has been used successfully for several years by the Federal Motor Truck Co., St. Louis. This company, through its head, Allen Baker, long ago realized that it must look after the trucks sold in the community, if it desired to hold the good will of its customers and build up an organization for permanency. A man losing money on the truck he has bought is by far a more critical customer than the man who has been stuck with a car which proved inferior.

The inspection system of the Federal company is carried on in quite a simple way. The inspector who is familiar with every phase of truck operation and furthermore knows everything mechanically there is to know about Federal trucks



Here is the machine shop of the Federal company. Practically any machine operation can be performed in this shop. Cylinder grinding, crankshaft grinding and similar work are possible by virtue of the complete equipment. The company does much of this work for outside concerns whose equipment is limited to certain work.

goes about his work in a Ford runabout. He is armed with a pad of inspection reports, a pencil and a kit of tools. That constitutes his equipment. He does not have a list of certain trucks to be inspected on a certain day. His hours are not regular. He does not call at a certain factory, for instance, to inspect one of their trucks only to find the truck 50 miles away. But, if he knows a certain truck is used for hauling meat to another town, he gets on the job early, before the truck has a chance to get away. He goes to the loading platform where the truck is parked and during the loading process gives it the once over. He

checks the various items on the report and when he has finished has a pretty good record of the truck's condition. He has a chance to study the load, the driver, the latter's way of handling the truck and may even ride for a ways with him.

Advising the Truck Owner

He comes back and spots another truck standing at the curb. He alights from his runabout and gives this second truck the same inspection. And so he goes on. His only requirements so far as the Federal Truck Company is con-

cerned is that he inspect 10 or 12 trucks a day as an average.

After the inspection comes the next essential thing is getting the report to the owner of the truck. He is the man most vitally concerned over the condition of the truck or trucks he has bought. The report is never sent to the driver, which obviously, would be a fatal mistake. Now, the truck owner's reaction when he gets the inspection report invariably is to notify the Federal company to go ahead with the work needed to bring the truck up to a good operating condition. He is impressed with the thoroughness with which the inspection has been carried out. He appreciates also that some of the smaller adjustments necessary to the truck were made by the inspector. In all probabilities he will get in touch with the company regarding the seriousness of the items which are checked to show that they require shop attention.

Another point which has helped the Federal company in furthering its maintenance of trucks is the equipment card made out for each truck as it comes from the factory. This card states the make of clutch, gearset, steering gear, universals, make and model of magneto, etc., fitted to that particular truck.

Obviously this information which is kept on file in the office is of great value in getting a man fixed up on the road who is stalled with a truck. Thus if the man calls up and states that his truck has a broken universal joint, the maintenance department of the Federal company simply refers to the equipment card of that particular truck and can then send the correct parts out by the service car, having every assurance that when the car gets there it will not have brought out the wrong parts. The company needs no other information from the driver of the stalled truck other than reference to the part which is giving trouble.

Rental Trucks

Naturally the Federal company is quite well aware of the fact that none of its customers can very well spare the use of their truck for any great length of time and consequently it has taken steps to help matters when a truck comes into the shop and the owner is anxious to go on with his trucking service. To meet this the Federal company has available at all times several trucks of its own which are called "service trucks." These are rented to customers at so much per day, the customer paying for all fuel, oil, etc. in addition, the same as he would with his own truck. These service trucks are kept in first class condition so that they will be instantly available when occasion demands.

One of the phases in truck maintenance which evidently has met with considerable success is the unit replacement system, whereby it is possible to get a truck into commission quickly by replacing a defective unit with one that is in good order, not necessarily a new one, but one which has been put into first class condition in the shop.

Such a system has been successfully



The Federal company does not wish its customers to be without the use of their trucks when the latter are undergoing repairs in the shop. Hence, it provides several "service trucks" which are rented for a nominal sum. This illustration shows several of the trucks and incidentally gives an idea of the cleanliness of the floor.

used in the maintenance department of the Federal company in St. Louis. The company keeps on hand such units as radiators, differentials, magnetos, carbureters, etc. Thus in a case of spring breakage the procedure is something like this.

The truck with the broken spring comes in and a new spring is installed. The owner of the truck is charged an amount equal to that of repairing his springs. This spring when repaired is then placed in the stockroom for the next man who comes along with a truck on which a similar spring is broken. The company does not do this with engines, because it is of the belief that every driver knows his own engine best and takes a fancy to it very often, which might not be the case should he get a similar engine, but which apparently did not suit him as well.

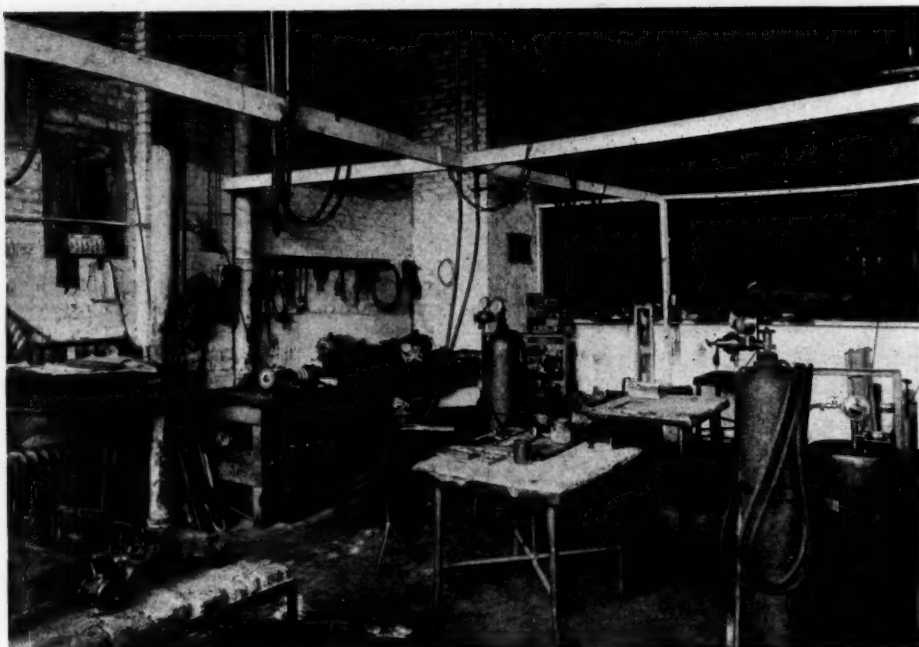
The Necessary Equipment

The machine tool equipment of the Federal company is probably as complete as is possible to find in any similar shop. The shop can handle any kind of lathe and shaper work, cylinder regrinding and crankshaft grinding. The shop does much outside work, especially the regrinding of cylinder blocks and fitting new pistons and rings. Wherever engines are worked upon they are securely held in adjustable engine stands, the latter making it possible to swing the engine into the most convenient position for the mechanic. This is an important item in the conservation of energy and also insures better workmanship. Reference to the accompanying illustrations will reveal the completeness of the equipment.

In truck maintenance, especially in the heavier vehicles, the item of removing bodies is an important one. This company has installed an overhead carrier by which one man can lift a heavy truck body from the chassis. The hoist is suspended by a steel structure and all danger to the workmen has been eliminated.

Truck maintenance involves another point which is more or less foreign to passenger car maintenance. This consists of the complete rebuilding of the vehicle. It means the tearing down of the entire truck, resetting the rivets of the frame brackets, forging new brackets where necessary, welding broken members, complete rebuilding of the power plant, transmission, etc., down to the painting of the cab or body.

With the excellent shop facilities of the Federal company it can readily accomplish this sort of work. The man who owns a truck or fleet of trucks is quite willing usually to have an otherwise good truck put into condition for further use, while the man with the passenger is more apt to want to dispose of his used car for one with a later body style. Hence the complete rebuilding of passenger cars is not looked upon so favorably by those in the maintenance business because the work involved runs up to the cost of the job so high that the owner is



The reclamation of broken parts plays an important part in truck maintenance. For that reason the Federal company maintains a complete welding and blacksmithing shop. Radiators are repaired in this division also

FEDERAL TRUCK CO. OF ST. LOUIS			
Date	Mar. 13, 1922	Inspector	Howe
Owner	Ben Longman		
Driver			
Items marked (1) were inspected by me and found satisfactory Items marked (0) required attention and were adjusted Items marked (X) will require shop attention.			
ENGINE	X	Steering Knuckles Right	/
Starting Crank Test	X	Steering Knuckles Left	/
Connecting Rods	X	Steering Arms	/
Main Bearings	X	Brakes—Service, Condition	/
Crank Bearings	X	Brakes—Emer., Condition	/
Wrist Pins	X	Truss Rod	/
Cam Gears	/	Radius Rod	Bushings X
Push Rods	X	Clutch	/
Valves	X	Axle, Front	/
Valve Springs	/	Axle, Rear	Rebuild X
Governor	X	Springs, Front	/
OILING SYSTEM	/	Springs, Rear	/
Leaking Crank Case	/	Cross Con. Tube	/
Leaking Trans. Case	/	Spring Hanger	/
COOLING SYSTEM	X	Sprockets	/
Radiator	/	Chains	/
Pump	X	Propellor Shaft	/
Connections	X	Wheel Bearings	/
Fan	/	Hubs	/
Fan Bearings	/	Oil Cups	X
Fan Belt	/	Grease Cups	X
CARBURETOR	Choke X	Shifting Rod Pins	/
GASOLINE Feed Pipe	/	Gear Shift	/
TIRE	/	Transmission	/
IGNITION SYSTEM	X	Universal Joints	Rear X
Magneto	X	Spring Shackles	Rebuilding X
Spark Plugs	/	Front Wheel	/
Wiring & Connections	/	Rear Wheel	/
Steering Gear	X	Frame	Paint X
Steering Arm	X	Truck Generally well taken care of?	/
Muffler needs repairing Cylinder covers leak Auto done on rear spring Cross tubes, Hand Throttle don't work. Signed by: Ed. L. Dow			

far more apt to trade in his car for a new one.

There are no such influencing factors as body style, etc. entering into the rebuilding of a truck. Some of the rebuilt trucks shown to a MOTOR AGE representative which had gone through the shops and paint department of the Federal company had the appearance of new vehicles.

Handling Bulky Parts

The work of servicing trucks is accompanied very often with considerable danger. The parts handled are bulky and heavy. Trucks must often be raised front or rear with jacks, or kept suspended in this way by hoists or supports of some kind. The Federal company has cut down accidents to the workmen 90 per cent by efficient methods of handling the work.

It generally is admitted that periodic inspection of trucks is essential in selling maintenance to the best advantage. Some sort of inspection blank is necessary in order to do the work properly. The one at left is used by the Federal Truck Co. of St. Louis and has been found to give very good results. The report is sent to the owner of the truck

Whenever a truck is raised at the front or rear end by a chain hoist heavy steel supports are placed under the axles as well. Thus, should the hoist give way or slip, there still are the supports to hold the truck. This not only insures the workman against accident, but also insures the truck against damage. In working on engines or moving them about they are held in suitable steel engine stands. The company realizes that the dropping of an engine may entail costs of repair which would far overshadow any profit which might have been made on the job.

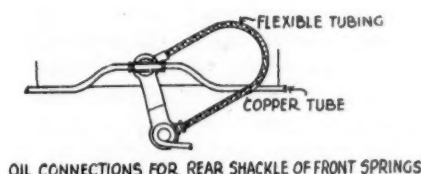
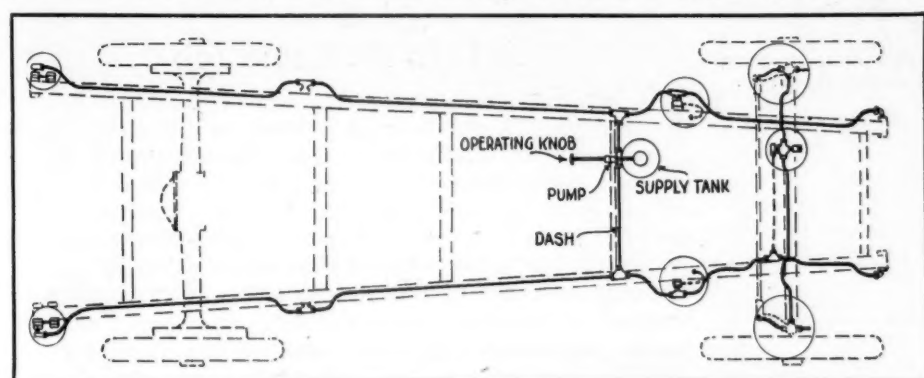
A Clean Shop

The item of cleanliness has been given much thought in the shops of the Federal company. In fact we have seen many a passenger car maintenance department, which when it came to clean-

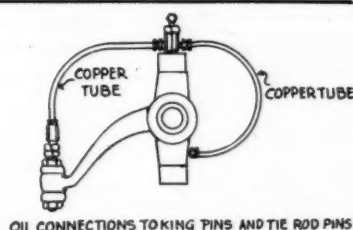
liness and orderliness could not compare with this truck establishment.

Trucks by virtue of the work they are called upon to perform naturally become more or less messy things by the time they have been in service for several months and so considerable dirt and grease is carried into the service department. But with methods like those used in the Federal company's maintenance department, this dirt and grease easily can be dispensed with. In the engine department, for example, no work is done on the parts until they have previously been cleaned on the floor below, in a department especially intended for this work.

This makes it easy to keep the shop tidy at all times and naturally builds up morale. Also, a mechanic is more apt to do a better job on a unit which comes in spick and span, to say nothing of the time saved by having the parts clean.



OIL CONNECTIONS FOR REAR SHACKLE OFFRONT SPRINGS



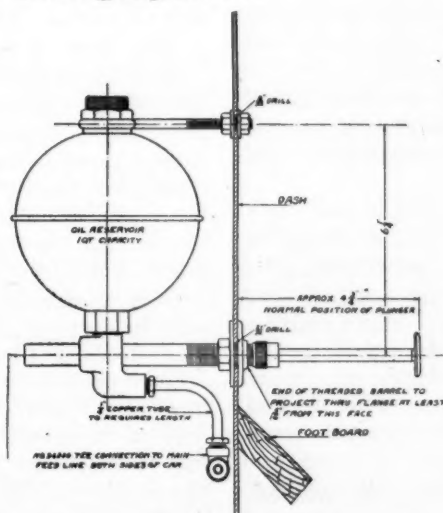
OIL CONNECTIONS TO KING PINS AND TIE ROD PINS

Installation of the Bloom chassis oiler on the Hudson super-six and Essex four. Below, oil connections for shackle bolts showing method of carrying oil to both bolts with one oil connection.

Kellogg Chassis Oiling System

A CENTRALIZED oiling system in which a small tank with an integral pump located behind the dash or some other convenient place on the car is used to take care of the chassis bearing surfaces, is being put out by the Kellogg Mfg. Co. The device is known as the Bloom chassis oiler and will be marketed under the O-K trademark.

The small tank in a typical installation is of spherical shape with a capacity of 1 qt. of oil. The integral plunger pump mounted in connection with it is operated from the driver's seat by hand. Pulling out the plunger draws a supply of oil into a chamber and pushing out on the plunger forces the oil through a lead which divides into two main pipe lines running down the frame on either side of the car. From these main supply lines are tapped off other leads for each part requiring oil. The pipes are rigidly clamped to the frame, and with



Sectional view through tank and plumb used for the Bloom chassis oiler made by the Kellogg Mfg. Co.

one or two exceptions where flexible tubing is employed, are stationary.

One of the most important features of the outfit and one which meets the objections usually offered to a centralized system is the method employed of damping up the various connections, leaving only a small hole for the oil to go into each bearing. Just before the point of oil distribution, a small disk is introduced into the feed line, this disk being pierced with a hole which is proportioned to the amount of oil required for that particular bearing. With this device the oil in the feed pipe is so equally distributed that when the pressure is applied, the oil is forced into all bearings. The connections are also equipped with these reducing plugs which reduce the amount of oil to be fed to bearings which do not require so much. The various connections are standard, all threads being $\frac{1}{4}$ in. Briggs standard pipe thread and all tubing connection for $\frac{1}{4}$ in. o. d. tubing.

Making Clutch Operation Easier

J. G. Koppel has developed a number of new devices intended to make the operation of passenger cars easier, suiting them particularly for lady drivers. He claims that many drivers, men as well as women, let in the clutch too quickly and thereby subject their cars to unnecessary strains. To obviate this he proposes to fit the clutch with an hydraulic dashpot. This consists of a cylinder and piston connected to the clutch pedal. When the clutch is opened the piston rises in the cylinder and encounters very little resistance, because the oil can flow freely through a large automatic poppet valve. On the other hand, when the clutch is being let in the oil has to pass through an adjustable needle valve, whereby its flow is retarded, so the time of engagement can be adjusted as desired.

In order to facilitate gear shifting Mr. Koppel has devised an hydraulic operated gearshift with electro-magnetic selection. The actual pressure for shifting the gears is derived from oil under pressure being admitted to cylinders in which there are pistons that are connected to the shifting bars. The valves admitting the oil to the cylinders are operated by solenoids controlled both by a selective switch and by a main switch, which is connected to the clutch pedal, closing as the pedal is depressed. A special feature of this system is that the oil in the shifting cylinders and pipes is under pressure only while the shifting takes place and that the electric current flows only during these periods.

ANCIENT BARN BECOMES GARAGE

Marion, Ill., May 22—A sales barn for mules and horses erected here in 1858 has been converted into a garage by the owner, Jacob Goodall.

MOTOR AGE

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Thoroughness in Inspection

MANY a repair operation is performed in the shop which, while it may remedy a local affliction, does not get to the seat of trouble.

For example, here is what happened to one motor car owner. He had noticed that the rear end of his car seemed to sag on the left side. The report from a service man was that the spring on that side had settled more than the other and that the spring seat on the axle was loose. He tightened this and apparently it did help some.

A few days later the same settling of the car body on the left side was noticed. However, as long as everything seemingly was all right otherwise, the owner disregarded the matter. Then he noticed that the doors on the left side did not open and close readily. This was indication that the body had settled in the center and was pinching the doors. Again a service man was called upon and he said the body needed "shimming up." He did this and the doors shut much better.

Still, the seat of the trouble had not been discovered, because thus far the service men had worked only locally. They had not searched deeply enough for the trouble. The owner once more complained that there

seemed to be an undue rattle and vibration in the body and chassis and only after a mechanic had crawled underneath the car was the real trouble discovered. The main frame channel was cracked through the bottom flange and up the side to within two inches of the top channel. Obviously this had permitted the frame to sag and the body went with it.

The repair was obvious, of course. The point we wish to make here is that the trouble should have been located by the first mechanic. Clearly he did not analyze the trouble. Naturally the owner wondered why the frame defect was not found the first time he brought the car in. The men had to get underneath to work on the spring and had they inspected the frame for defects they could easily have found the trouble. It is simply another plea for thoroughness in inspection.

It is far better for all concerned to inform an owner of existing trouble in his car than to have him come in again and again and leave him wondering why he was not informed in the first place.



All On the Same Job

IT is unfortunate that more of the local maintenance managers cannot be represented at the semi-annual meetings of the Service Managers of the National Automobile Chamber of Commerce. Such a meeting was held in Detroit last week and if the local men engaged in specific jobs in their own territories could get an idea of the earnestness of the factory managers, their willingness to tell each other of their problems and their method of handling them, the local men could not fail to be impressed that these men at the factories are working earnestly to bring about a better situation in this great branch of the automotive industry.

At this recent meeting there were three local men present as delegates—one each from the Brooklyn, New York and Syracuse service associations. These men will carry back to their home membership reports that the factory service managers are sympathetic with local service associations; that they are going to do their best to promote the local movement and that the factories and component parts members are quite willing to supply speakers for local associations that they may promote a more widespread knowledge of the products that the men are working on in their shops every day.

These delegates had something to say during the meeting and they were always listened to with respect and attention. The factory men were deeply interested in the view of the man on the firing line.

It is when there are more up and going local associations that these semi-annual meetings will do their best work. Then these meetings will contribute more to the mutual understanding between the man in the ranks and the man at the head of the department in the factory. Without this understanding and without the knowledge on the part of each that the other is interested in his job, the best results cannot be obtained.

It is undeniable at present that there is some suspicion in certain places that the factory service manager likes to show his authority and, on the other hand, some service managers are likely to think that the man who meets the owner is lying down on the job.

Neither suspicion is justified and one way to learn this is for these men to meet each other. This is not physically possible and the next best thing would be for the local men to get together, send one of their own men to attend these meetings and then to hear from him in turn just what kind of men are working out these

connecting link problems between the various departments of the factory and the man who must keep the vehicle going.

Proper organization would be a great step toward welding this great maintenance industry into one of mutual understanding and confidence.



Can You Afford to be Without— A Cleaning Tank?

MUCH time is lost in automotive shops in cleaning parts taken from a car. Often there is grease on the one side of the part and mud on the other. Before any work or inspection with calipers or gages can be performed on parts they must be cleaned; a job which can be done by a relatively inexperienced man.

It is surprising to see a fairly high priced mechanic doing such work when he should be busy only on jobs requiring skill. In the small shop, of course, a mechanic may have to do much cleaning of parts; but large or small, every shop should have some means whereby parts may be cleaned in minimum time and without a waste of time on the part of the mechanic.

The market affords apparatus whereby parts are quickly cleaned by coming in contact with a solution which removes grease and dirt. The parts only need be suspended in the solution for a short time, whereupon they are ready for the mechanic. This means there will be little or no dirt or grease to mar the looks of an otherwise tidy shop. The mechanic will be more presentable, will work faster and with greater satisfaction.

Some shops have made their own cleaning vats or tanks. Some use a hot soapy solution and compressed air to clean parts. But, whether the apparatus is bought or made in the shop, it is one of the most valuable articles of equipment in the establishment. A mechanic, especially the better class man, dislikes to work on a job that is dirty and greasy. Besides it runs up the cost of a job. If work is to be gotten out quickly and satisfactorily, there must be every effort to prepare it properly and one of these should be that parts are well cleaned before the mechanic begins work.



A Worthy Mechanic's Foundation

TWO of the questions that most frequently come to MOTOR AGE are "What books shall I read?" and "What school shall I attend?"

These are extremely difficult questions to answer, even for the person who is acquainted with all of the circumstances, but when they come, as they usually do, in a letter without any explanation of the previous training, it is especially difficult to give to the ambitious young man the answer that he should have.

Judging by the great mass of the questions that come to MOTOR AGE on mechanical subjects, it would be quite the safe thing to do to advise these young men to attend the nearest high school where they would have the opportunity of studying physics and some mathematics beyond the arithmetic that permits the youth to quit the eighth grade creditably. Automotive mechanics is a complicated and extensive study and the youth cannot expect to come into the full success without a fair equipment of the fundamentals that are involved.

A great many of the young men who are working in this business appear to believe that learning to follow a wiring diagram is a large part of the necessary equip-

ment of being an automotive electrician. But in the schools where automotive electricity is most successfully taught, the students are trained in electricity for quite a period before they are even told that it is a part of the equipment of an automobile. Of course they know that it is so used, but the point is that the teachers who are having the greatest success in this line consider the fundamental knowledge of the subject of the greatest importance and consequently they drill their students in this part of the work before introducing them to the complicated systems involved in automotive work.

Other questions that are received indicate that the writers, who, as a rule, are in charge of the maintenance work in some shop, have learned their trade working on a certain car and when they are suddenly confronted with a problem on another car, they are more or less helpless because they have learned the work by rote and have not understood the fundamentals.

In many cases it is self evident that these men have not studied steam engineering at all, nor are they able to work out their problems when anything more than the most simple mathematics are involved.

Usually the ambition for study comes when the man is promoted to a position of some responsibility and then realizes his shortcomings. He then wants to take advantage of some quick, short route to a more complete knowledge of his job. There is no such route. There are helps, of course, but these helps will not solve the difficulties. As long as there is a lack of fundamental knowledge, the man who is ambitious to be master of automobile mechanics can never be sure of himself. The only hope is to begin at the beginning and get himself right. There are many books printed on automotive mechanical subjects, and there are many schools, but the books are of only passing value if the reader has not the primary part of the education necessary and the schools are of little value unless they include the fundamentals in their course, or require an examination of the applicant to show that he has had this work.

Books and schools mean little in themselves. In both cases they may prove sufficient if the student will do his part. Both will fail unless the student does his part. Some men who have been coached and pushed through very excellent schools have failed because they could get nothing out of their education. Some very excellent engineers have wrested their education from the most meager sources.

Tools will never make the craftsman any more than good equipment will make a sportsman. Good tools and good facilities will help, but the will must be behind them.

The first requisite of a good automotive mechanic is sound fundamentals.



AFTER THE SALE, WHAT?

GOOD selling is an important function of every establishment that has merchandise to offer to the public. But selling alone will not solve the entire problem. The "Ask 'Em to Buy" movement has given selling an upward push. Those who have acted according to the advice given have done well for themselves, but after the goods start to move, there are other problems. In order to sell well and profitably, you must buy carefully and well. Selling is the life of the automotive industry, but it must have a foundation on which to stand. Many an excellent salesman has gone broke because he did not have a good buyer or a good collector. After the sale, what?

Production Far Behind Orders

Business in Sight to Keep Factories Busy Until July

Passenger Cars and Trucks Still Selling Briskly With Farmer Buying Yet to Come

NEW YORK, May 23.—It is no exaggeration to say that the manufacturers of practically all established lines of passenger cars are far behind on orders. There is no doubt that May will be the biggest production month the industry ever had and unless there are wholesale cancellations of orders now on the books of dealers, the business in sight will keep the plants going at top speed until the middle of July.

If cancellations are in prospect, there are no indications of it now. Buying is as brisk as it has been for two months. As demand slackens slightly in one section of the country it shifts to another, so there is no diminution in the total. Farm buying will not begin in earnest before July 1.

While the industry is running at capacity, most car and truck manufacturers are keeping a weather eye out for squalls and up to this time they have shown no disposition to cast caution aside as they did when buying was at its peak in 1919 and 1920. It is admitted that they have ample plant capacity to meet all needs for a long time to come except in isolated cases.

There is a shortage of certain parts and materials, notably malleables, but the parts handicap is not so pronounced as it was last month except in the case of bodies. All the year round demand for enclosed cars has increased sharply in the last year, with falling prices for models of this type, and body manufacturers have been unable to keep pace with it. It is probable there will be some expansion of plant facilities in this field to meet changing conditions.

Few vehicle manufacturers are making commitments for more than 60 or 90 days and they are not accumulating inventories. While they do not expect any sudden sharp falling off in demand they propose to be prepared for emergencies and with commitments only for short terms they will be able to turn around, no matter what happens.

Skilled automotive labor is scarce in the principal centers, such as Detroit, Cleveland and Indianapolis, and many young men who returned to the farms when they were laid off during the slump of 1920 are going back to the factories. The consequence is that farm help is getting scarce, especially in Michigan.

Up to the present motor vehicle builders have not begun to bid against each other for factory help as they have in other boom days. They are operating on a much smaller margin of profit than they

did then and if labor costs go up materially it will be necessary to raise car prices. Metals are somewhat higher than they were a few weeks ago and parts prices have stiffened since makers cleaned up their inventories and partly fabricated stocks.

218,456 Cars and Trucks Made in April, Reports Show

Washington, May 22.—With reports still lacking from a few small companies, the automotive division of the Bureau of Foreign and Domestic Commerce announces that April production of passenger cars and trucks aggregated 218,456, which is only approximately 1,500 less than the record for a single month established in March, 1920. Passenger car production totaled 196,512, an increase of nearly 30 per cent over March, while truck production was 21,944 compared with 19,449 for the same companies in the preceding month. The following table gives the production for identical companies for the past four months.

	Pass. Cars	Trucks
January	81,638	9,204
February	109,039	12,968
March	152,647	19,449
April	196,512	21,944

\$110,000 Bid For Maibohm Motors Co.

Toledo, May 20.—The Maibohm Motors Co., Sandusky, was bid in for approximately \$110,000 by E. G. Kirby of the Commerce Guardian Trust and Savings Bank, this city, chairman of the Creditors' Committee at sale in bankruptcy conducted by Referee Fordyce Belford at Sandusky.

The Creditors' Committee will turn the property over to a new Ohio company known as the Arrow Motors Co., Sandusky, in accordance with the plan previously approved by creditors. An entirely new car to sell in the \$1,500 class will be manufactured.

GENERAL MOTORS DOUBLES OUTPUT

New York, May 22.—The automobile and truck divisions of the General Motors Corp. produced and sold approximately 40,000 units in April. This total undoubtedly will be exceeded in May. General Motors plants in the United States and Canada produced approximately 115,000 motor vehicles in the first four months of 1922. This more than doubles the production for the same period last year. Chevrolet heads the production list, and is now making cars at the rate of 1,000 a day. It is reported that even with its new plant operating at capacity, Cadillac is unable to meet the demand for cars. Buick is operating at 65 per cent more than last year and is expected to reach a new high mark in May.

Protesting Group Acts to Organize Rival of A. A. A.

Three State Associations Join in Movement—Regulars Elect Officers in St. Louis

ST. LOUIS, May 22.—Dissension in the American Automobile Assn., in national convention here last week, resulted in the formation of a committee of dissatisfied delegates to organize a new association. The parting came over the seating of delegates from the Chicago Motor Club. It was claimed that the Chicago club, having withdrawn from the Illinois Automobile Assn., should not be recognized as a member of the A. A. A. A majority of delegates, however, voted to seat the Chicago representatives.

The committee to organize a new association is headed by Fred H. Caley, of Cleveland. The Ohio, Indiana and Illinois associations joined in the protest movement.

Officers elected by the A. A. A. were the following: President, George Diehl, of Buffalo; secretary, Arthur Fifoot, Hartford, Conn.; treasurer, H. A. Bonnell, New York.

Improvement Continues in Retail Sales in Nashville

Nashville, Tenn., May 23.—Since Jan. 1 there has been a constant improvement in the automobile business in Nashville, and conditions today are better than they have been since the spring of 1919. Virtually every motor vehicle sales establishment in the city, by the testimony of the dealer and his staff of salesmen, as well as by the appearance of the establishment itself, provides ample evidence that the public is buying motor cars in large quantities.

New sales records are being made from day to day, and there is every indication that the demand will hold up throughout the summer. On the more popular makes and models, the supply is over-sold, and the used car market, which during a considerable part of last year was more or less discouraging, has improved proportionately.

There are two underlying reasons for this gratifying state of business in Nashville, according to dealers. One of these is the stabilization of prices; the other is the world need of motor cars.

MINNEAPOLIS TRACTORS REDUCED

Hopkins, Minn., May 22.—The Minneapolis Threshing Machine Co. has reduced the prices of its farm tractors. The list follows:

	Old Price	New Price
1225 h. p.	\$ 900	\$ 800
1730 h. p.	1675	1600
2244 h. p.	3000	2650
3570 h. p.	4150	3850

Factories At Greater Efficiency

N. A. C. C. "Facts and Figures" Compares Production by Years

Wholesale Value of Car and Truck
Output Last Year Was
\$1,260,000,000

NEW YORK, May 23—Interesting statistics with reference to the automotive industry are contained in the 1922 issue of Facts and Figures, the annual year book of the National Automobile Chamber of Commerce, which is now on press. In view of the fact that if passenger car production continues at anything like the present rate, a new record will be established in 1922, the following table showing passenger car production and wholesale value since 1899 is interesting:

Year	Number	Wholesale Value
1899	3,700	\$ 4,750,000
1904	21,281	23,634,367
1909	127,731	158,918,506
1910	181,000	213,000,000
1911	199,319	240,770,000
1912	356,000	335,000,000
1913	461,500	399,902,000
1914	543,679	413,859,379
1915	818,618	565,978,950
1916	1,493,617	797,469,353
1917	1,740,792	1,053,505,784
1918	926,388	801,937,925
1919	1,657,652	1,461,785,925
1920	1,883,158	1,809,170,963
1921	1,514,000	1,093,918,000

Motor truck production and wholesale value for years since 1904 follows:

Year	Number	Wholesale Value
1904	411	\$ 946,947
1909	3,255	5,230,023
1903 to 1910	10,374	20,485,500
1911	10,655	22,292,321
1912	22,000	43,000,000
1913	23,500	44,000,000
1914	25,375	45,098,464
1915	74,000	125,800,000
1916	90,000	157,500,000
1917	128,157	220,982,668
1918	227,250	434,168,992
1919	316,364	423,326,621
1920	322,039	423,756,715
1921	154,550	166,082,000

The value of complete car and truck output in 1921 was \$1,260,000,000. The value of parts and accessory output was \$409,710,000 and the value of tire replacements was \$542,358,420.

It is estimated by Facts and Figures that the capital investment in the motor vehicle manufacturing business is \$1,423,500,000; the cost of material purchased, \$1,058,230,000; the number of employees, 186,000; wages and salaries, \$299,498,780.

Tire casings produced in 1921 totaled 27,275,000; inner tubes produced, 33,878,000; solid tires produced, 529,705.

An analysis of truck production by capacities for 1921 shows that 33,809 or 21.9 per cent were of $\frac{3}{4}$ ton capacity and 79,844 or 51.6 per cent were of 1 ton.

Facts and Figures estimates that there are 2,850,000 passenger cars and 150,000 trucks on the farms of the country.

RECEIVER FOR COMMONWEALTH

Chicago, May 22—A receiver has been appointed for the Commonwealth Motor Co. by the Federal Court here upon application of a number of creditors, whose claims aggregate \$35,000. The company was organized a few years ago to manufacture the Commonwealth car, which later was discontinued. Recently the company has been manufacturing taxicabs at its plant at Rockdale, near Chicago.

The material on hand and the contracts of the bankrupt company have been sold by the receiver to the Checker Manufacturing Co., manufacturer of Checker taxicabs. The Checker company has rented the Commonwealth plant for 30 days, with option to renew the rental for an additional 30 days, and is operating the plant. The Checker company states that this is only a temporary arrangement and that it does not expect to acquire the plant, but will in the near future establish its own plant in Chicago.

DURANT CALIFORNIA FACTORY

Oakland, Cal., May 22—Announcement is made by R. C. Durant that within 60 days from May 15, the factory of the Durant Motors Co. of California, now being erected in this city, will be in operation. The plant is being built at a cost of approximately \$3,000,000, says the announcement, and has 300,000 sq. ft. of floor space, with capacity for an annual output of 50,000 cars. Employment will be furnished for 800 to 1,000 men, with an office force of 200. The annual payroll at the start will be \$2,000,000 a year, according to this announcement.

VAN SICKLEN MANAGES APPERSON

Kokomo, Ind., May 24—Announcement is made of the appointment of N. H. Van Sicklen to be general manager of Apperson Bros. Automobile Co. In this connection the Apperson company points out that Van Sicklen owned and drove the first four-cylinder "Jack Rabbit" Apperson car turned out from the factory. Van Sicklen has had a long career in the automotive industry and from 1904 to 1908 was owner and publisher of Motor AGE. He became assistant general manager of the Apperson company last March.

OAKLAND FLAT RATE PROGRESS

Pontiac, Mich., May 23—According to W. R. Tracy, assistant sales manager of the Oakland Motor Car Co., the new flat rate for service on the Oakland car is now in effect in nearly all the larger branches and agencies of the company and is being rapidly adopted by the smaller agencies.

"While it is our intention eventually to require this flat service rate," Tracy said, "it will take time to get it completely established in the smaller places."

High Point of Production to Be Reached This Week

Materials Now Available in Sufficient
Quantities and New Employees
Have Learned Jobs

DETROIT, May 22—Production marks which have been climbing steadily in practically every factory in the Detroit district since early Spring, will reach their highest point in the last ten days of May. With scarcely an exception, new production marks for a single month will be set unless there is a combination of circumstances now unforeseen to prevent.

Material is now being received in quantities to meet requirements, and men who have been added to the factory forces in the past two months are at high efficiency. More men are being added daily in all factories, especially the body plants which have found it necessary to break in new men in the absence of recruits from skilled ranks.

Night work is now on an established basis in the final assembly departments of most plants. Sunday work for the present is an accepted fact and Saturday afternoon holidays in most plants have been abandoned.

In the stress of getting cars out on schedule a number of companies have adopted unit parts of makes other than their own to help speed up and to overcome shortage of labor. Though this is for the most part an arrangement made necessary by the heavy production strain, there is certainty that in several cases these parts will be permanently incorporated in the make-up of cars as announcements of models later on will show.

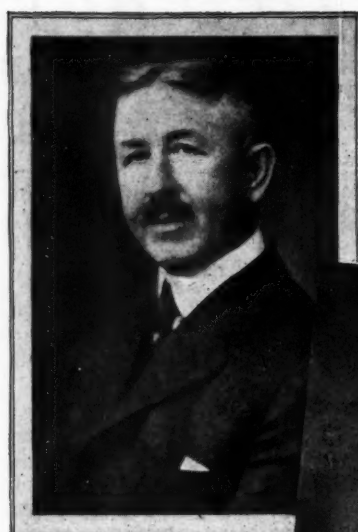
Despite the speed and the addition of hundreds of new men in recent weeks, inspections on work is being kept very strict. The spirit of building for the future is manifest. The cars of May, the highest production the industry has known, will be as mechanically perfect and exact as the cars built in the height of the slack season last year.

One of the developments of the dull period was the building-up of a very strict inspection on the part of distributors and dealers of new cars before turning them over to the owner. This dealer inspection is now a bulwark against the possibility of inferior work reaching the final owner. There is no record of any cars being turned back to the factories, which is an indication of the high grade of workmanship insisted upon.

EARL \$100 HIGHER

Jackson, Mich., May 23—The Earl Motor Car Co. has increased the price of its phaeton from \$995 to \$1095 and the sedan from \$1695 to \$1795.

New Officers of Michigan Trade Association



W. K. Philip, Vice-Pres.,
Grand Rapids



H. H. Stuart, Sec'y.



M. L. Garlock,
President,
Lansing



W. D. Edenburn, Mgr.,
Detroit



A. L. Zeckendorf,
Treasurer

Detroit, May 22—The new board of directors of the Michigan Automotive Trade Association has outlined a plan of activity providing for meetings in the larger cities of the lower peninsula of Michigan in June. Included in the plan

is a membership campaign in which every regional director and manager will participate. Each congressional district of the state is represented on the board of directors and the new president, M. L. Garlock, has assigned a membership quota to each district.

CALIFORNIA SALES INCREASE

San Francisco, Cal., May 23—Automobile sales in California during April of this year were greater by 35 per cent than they were in April, 1921, according to figures compiled from the registrations of cars at Sacramento and from sales-reports of dealers throughout the state. The increase amounts to 3,205 cars, there having been 9,046 cars sold in April, 1921, as compared with 12,251 cars in the April just passed. The figures of April, 1922, also show that sales for 1922 are steadily and comfortably increasing, there having been 11,603 passenger cars sold in March, with an increase of 648 in April, and March usually is regarded as the best month of the

year in automobile sales on the Pacific Coast. Indications are that May will beat April in total sales, and that what was at first thought to be a mere spring spurt in selling, will prove a steady return of automotive selling to normal, throughout 1922.

ENGINE FACTORY BURNED

Buffalo, May 23—Fire on May 16 destroyed the old Curtiss airplane plant at Hammondsport, causing loss to buildings and contents of more than \$25,000. The plant was owned and occupied at the time of the fire by the Keuka Industries, Inc., manufacturers of automobile engines and accessories. Three buildings and their contents were destroyed in the blaze.

Rapid Growth of Exports Reported by Hudson-Essex

Surprising Number of Orders Received from England—South America Buying Heavily

DETROIT, May 23—Heavy increases in the Hudson-Essex export business have caused the company to establish a fixed percentage of the total output of the two lines for its export business, and orders are now being taken subject to delivery as the export proportion of its product permits. In fixing the export ratio, factory officials declare that the company has taken into consideration the plight of the export agents in the past 18 months and have favored them slightly over the domestic distributing organization.

European business, hitherto slow, is picking up briskly and orders are booked for some time to come. England is reported ordering enclosed cars in surprising volume. Shipments have been resumed to the northern European countries, including Denmark, Norway and Sweden. Canadian business is reported becoming especially good.

The receipt of a letter recently from a dealer in Java is reported by the company, in which the dealer said business prospects were very poor and that he didn't know when an order for a volume shipment might be placed. The day the letter arrived a cable was received from the same dealer ordering \$50,000 worth of Hudson and Essex cars for immediate shipment.

South American business, especially in the Argentine, is reported increasing rapidly. South African business continued steady despite the recent labor disturbances and showed slight increases. Good business is reported from Australia, in which the enclosed car demand features in increasing quantity. Shipments are now being made to 50 companies, and to date these exceed 1921 shipments by 250 per cent.

GARY TRUCKS INCREASED

Gary, Ind., May 22—The Gary Motor Corp. has increased the price of all models of its trucks with the exception of model F 1½ ton which remains at \$1,675. The new and old prices are as follows:

		Old Price	New Price
Model I	2 ton.....	\$2,150	\$2,250
Model J	2½ ton.....	2,550	2,650
Model K	3½ ton.....	3,350	3,650
Model M	3 ton.....	4,000	4,100

14,000 FRANKLINS A YEAR

Syracuse, N. Y., May 22—The Franklin production schedule, beginning today, is increased to the rate of 14,000 cars a year. Orders received on three days last week for June delivery were 467 cars, about 50 per cent of the month's output. The company states that on one day this month dealers delivered Franklin cars having a retail value of \$1,004,515.

Best Business in Four Years for San Francisco Dealers

Factories Paying More Attention to Pacific Coast—Some Establish New Branches

SAN FRANCISCO, Cal., May 23—The automobile dealers of San Francisco are settling down to a summer of the best business they have had in four years, and they are strengthening their sales forces and their out-of-town agencies accordingly. There is a tendency already manifest to "tighten up" on deferred-payment sales, to ask a larger first payment down, and to value more closely the used car offered in exchange, largely because the manufacturers have distributed notice that their production this year will be confined more closely to the actual prospective demand than ever before, and the dealers are seeking quality rather than quantity in their prospects.

The manufacturers are showing increased interest in western territory, and a number of factory representatives have been touring the Pacific Coast, some of them settling permanently in offices here. J. A. Benell, Haynes factory representative, is the latest to make the tour. He has been for some days with Philip S. Cole, local Haynes distributor, and has lectured to the dealers along educational lines, on the benefits of co-operation with the factory.

French Will Open on Coast

J. E. French, former director of distribution at the Dodge Brothers plant, has come to the coast to head the company bearing his name which is to distribute Dodge cars in San Francisco and Oakland. Headquarters have been opened in the northern hall of the big H. O. Harrison building.

French is well known on the coast, for, as factory representative, he appointed virtually all the Dodge distributors and dealers in Washington, Oregon and California, when the Dodge company began producing its car about eight years ago. C. A. Schumacher is salesmanager of the new J. E. French company, and F. L. Pierce is service manager. A. Van Dorn is in charge of the mechanical department, and Fred Ehlers is field service man. The present place of business is temporary.

Fred. J. Linz, who has handled the National for many years, has taken new quarters near the center of the automobile-selling industry of the city.

T. H. Wilkinson has been appointed western representative of the Lee Tire & Rubber Co., and has established headquarters with the Chanslor & Lyons Co., automotive equipment jobbers, who are Pacific coast distributors for Lee tires.

The Pioneer Motor Co., San Francisco distributors for the Peerless, has moved into new quarters, and has installed a complete sales and maintenance organi-

zation, with equipment for all lines of Peerless work. L. A. McLuney is the new manager for this city. The Pioneer company is a direct factory branch of the Peerless plant in Cleveland.

The Kissel Motor Car Co. has established wholesale headquarters and Pacific coast distributing depot here. All coast points will be supplied with Kissel cars and parts from this central headquarters, according to Gilbert Woodill, western representative.

G. O. Barnes and S. J. McDonogh have formed the Barnes-McDonogh Motor Co., Inc., to act as agents for the Buick in Sacramento. Barnes has been selling Franklins and McDonogh selling Buicks in San Francisco for several years.

Deliveries Hold Up Sales; Maintenance Departments Busy

Chicago, May 22—Loss of a number of sales, because of inability to make deliveries is reported by many of the dealers here. Some establishments are as far as 200 cars behind on orders booked and there are few who have not oversold their allowances.

Maintenance work is already on the up-stroke and many departments and stations are employing their full quota of men. The Middle States Motors Corp., distributors in this city of the Columbia, report sales inquiries in abundance although few cars are ready for delivery.

Though the local Ford assembly plant went into capacity production April 1, some agencies find it necessary to make sales wait a week or ten days for delivery. Fordson tractors form a big part of the sales of the Ford company.

STUTZ SALES CONVENTION

Indianapolis, May 22—The custom of holding sales conventions during the week of the 500 mile race will be followed by but one Indianapolis factory this year. The Stutz Motor Car Co. will hold a three day sales convention May 29 to 31 inclusive. The business meetings will all be held at the plant and the dinner to be given by the factory to the visiting distributors and dealers will be held at the Lincoln Hotel.

Marmon dealers are expected at the factory for short visits the day before or after the race. Neither Cole, H. C. S. or National, which in the past have held dealer meetings, expect any activity of this sort this year.

LINCOLN RECEIVER OBJECTS

Detroit, May 20—Detroit Trust Co., as receiver for Lincoln Motor Co., has filed objections in United States Court to the War Department's claim of more than \$9,000,000 for alleged over-payment on war contracts. The bill stated the receiver has not been fully informed of the nature of the government's claim and argued that all claims should have been presented in 1919, when an agreement was reached and the contracts settled in full.

Immediate Deliveries Have Become Rare in Milwaukee

Dealers' Stocks Have Been Exhausted and Factory Output Can't Keep Up

MILWAUKEE, Wis., May 22—Dealers here say they can discern no sign of any let-up in the brisk demand for passenger cars which they have been experiencing for about sixty days. Sales volume is gaining every week, although the present progress naturally is not quite so rapid as when the period of active demand was setting in. Still, all look for an active June and future months.

Increases in sales are not entirely uniform with all concerns. Some are smashing all past records, while others are making slower headway. All, however, are doing better than last year at this time.

The new Mitchell F 50 series is meeting an almost unexpected response in this locality. The Chevrolet also is establishing some new marks. Milwaukee county dealers disposed by May 15 of an entire train load of cars, containing 186 automobiles, received here May 1, and up to this date have secured sufficient orders to make it practically certain that a duplicate of this shipment can be ordered for delivery June 1.

These are merely specific examples of the manner in which Milwaukee dealers as a whole are doing business. Some are in a less favorable position than others with respect to placing cars in the hands of purchasers. As a general rule, immediate delivery is rarely possible now, as surplus stocks have been wiped out and factories are not able to bring up production as fast as they are booking orders. In some instances, dealers are unable to promise delivery even of open cars before 15 to 30 days, while enclosed cars are dated ahead even more.

TO SELL PARENTI CO.

Buffalo, May 20—The Marine Trust Co., trustees for the Parenti Motors Corp., will begin selling the property of the concern on May 23. This announcement was made by letters to stockholders of the Parenti firm. Frank M. Hickok of the Marine Trust Co., said that the property appraised at \$388,000, exclusive of stock and raw materials, is all of the tangible assets to show for more than \$3,000,000 worth of stock that has been issued to more than 11,000 stockholders. Liabilities are reported at \$200,000 and more than \$400,000 in claims have been filed with the trustees.

NEW COLUMBUS PRESIDENT

Columbus, O., May 22—At the regular weekly meeting of the Columbus Auto Dealers' Co., the organization of dealers and agents, O. C. Belt, head of the Belt-Franklin Automobile Co., was elected president.

Greatly Increased Automotive Business at Fort Wayne, Ind.

Tank and Pump Manufacturers Running at Higher Speed Than Ever Before

FORT WAYNE, Ind., May 20—Local automotive concerns are experiencing greatly increased business.

At the Dudlo Mfg. Co., which turns out coils for Ford and for a number of other concerns, a new building 120x70 feet is being rushed to completion to relieve the crowded factory conditions. The Peru plant of this company which has just been opened will probably put in winding machines for Ford coils, too. There are now 1200 men employed at this plant, which is the greatest force in its history. A night force has been installed and within the month more men will be placed on the force to operate winding machines.

"Our production has been speeded up to the best it has ever been," said an official of the Wayne Tank & Pump Co. "We have 200 employees in the office and 525 in the factory. Enlargements in the force are now being made. We have two shifts working in the machine shop putting in 80 working hours a week and other factory departments are working nine and one-half hours a day."

S. B. Bechtel, president of the S. F. Bowser & Co., Inc., tank and pump manufacturers, said: "We are working a full force full time on the day side and are working a small night force in the machine shop." About 1400 men are now employed in the Bowser factory.

Local dealers in new and used cars and accessories also state that business is becoming much better than it has been and local automotive people are all set for a big summer.

LAST OF BRISCOE LINE

Detroit, May 20—Earl Motors is closing out the last of its Briscoe line which will be held in cities within easy delivery distance of the Jackson factory. Sales in Cleveland and Detroit have resulted in a heavy business which has practically closed out the last of the roadster model, leaving only a limited number of phaeton and enclosed cars.

The phaeton model equipped with front and rear bumpers and with side windshield wings, sold in Detroit for \$675. The closed models sold for \$1000. Maintenance on the car is guaranteed and will be handled through the regular Earl dealers.

TEST GASOLINE CARS

St. Paul, May 20—The Great Northern railroad has started a test of rail gasoline buses on various routes to compete with the highway passenger transportation companies. Those buses, it is announced from the general offices here, will be tried on short lines, two in Minnesota, one in Montana and one in Washington. The four machines will be in

service by July 4. One bus, to be utilized between Sandstone and St. Cloud, Minn., will have a trailer with a total seating capacity of 65. The other motor cars will seat 45 each and will have a baggage compartment. Another car will operate on the Browns Valley line in Minnesota, one on the Somers-Columbia Falls lines in Montana and one between Anacortes and Rockport in Washington. The trucks are a Mack, White, Service and Four Wheel Drive.

Garagemen Give "Ask 'Em to Buy" Dinner for Employees

CHICAGO, May 20—Employees of members of the Chicago Garage Owners' Association were entertained at dinner at Hotel LaSalle the evening of May 17 by the association and after the dinner Ray W. Sherman, merchandising director of the Automotive Equipment Assn., delivered a merchandising address and exhibited the "Ask 'Em to Buy" film.

There were about 100 garage owners and about 100 employees present. Most of the employees were those selected by the proprietors because of long service or special fitness for favorable contact with customers.

The merchandising talk was directed principally toward the opportunities of the employee to sell equipment to customers with whom he comes in contact by suggesting and demonstrating the usefulness of various accessories. The members of the association at a meeting about a month ago heard the merchandising talk and saw the pictures and it was after this that they decided to hold a special meeting for their employees.

Since seeing the film and hearing the lecture a number of the garage proprietors who were not selling accessories have added accessory departments and in some instances are paying employees a commission of five per cent on sales.

SALT LAKE CITY INCREASES

Salt Lake City, Utah, May 22—More automobiles were sold here last week than in any other week for a year. The wholesale as well as the retail business was excellent. Many dealers have sold out their stocks and are making deliveries direct from the freight cars. One reason for the rush is the lateness of the spring. Many buyers put off buying a car so long as the weather was bad. Dealers also think that the public has decided that prices are now about as low as they will get. They report the used-car trade as good and say that some real bargains have been picked up.

The industrial situation in this territory is better now than it has been for the past 18 months or two years. The metal mines are open again and the unemployment conditions have improved to such extent that there are few, if any, jobless men in the state.

Car Registration in New York Gains 100 Per Cent

April Shows Big Gain in Both Low and High Priced Cars

NEW YORK, May 21—Registrations of new cars in ten counties in and around New York aggregate 21,081 for the first four months of 1922 as compared to 11,510 for the same period last year. April showed a good gain over the preceding month both in the high and lower priced classes.

Of the cars priced at \$2,500 or less, 14 have registered more than 200 since the first of the year, three have gone over the 2,000 mark and one has nearly approached that figure. The remainder go from 228 to 579. In the higher priced class nine cars have registered more than 40 for the first four months.

A summary of registrations for the ten counties, taken from the monthly report of Sherlock & Arnold, publishers of the Automobile Sales Analysis, is as follows:

Cars Below \$2,500			
	1922	1921	
January	2,018	483	
February	2,231	1,409	
March	6,354	3,396	
April	8,407	4,810	
Total	19,010	10,098	
Cars \$2,500 and Above			
January	283	145	
February	273	210	
March	632	487	
April	883	579	
Total	2,071	1,412	

MOTOR VEHICLE REGISTRATION

Washington, May 20—Motor vehicle registration for the year 1921 totaled 10,448,632 cars, representing an increase of more than 1,000,000 over the preceding year, according to figures made public by the Bureau of Public Roads of the Department of Agriculture, based on returns from States. The greatest percentage of increase was shown in the industrial section. The total amount collected for fees of different kinds amounted to \$122,478,654.

These figures are particularly interesting in view of earlier registration figures compiled by the Goodrich Rubber Co. estimating the number of cars at 10,524,395, or an increase of 75,762 over the total which was reported by the government. The government figures placed the registrations of 1920 at 9,231,941.

USED CAR PLAN WORKS

Utica, N. Y., May 21—The used car co-operative plan participated in by the entire membership of the Utica Motor Car Dealers Assn., Inc., with additional co-operation from the Herkheimer County Dealers Assn. and the Rome Dealers Assn., is working out successfully. The plan brings virtually all dealers in the two counties into co-operation in getting used cars at fair prices and selling them without loss.

Statistics For the First Quarter of Rubber Industry

Marked Improvement Is Shown Over Same Period For 1921

NEW YORK, May 21—Statistics of the rubber industry for the first three months of the year as compared with the same period in 1921 follows:—

	Pneumatic	Casings	
	Inven- tory	Produce- tion	Ship- ments
1921			
January	5,319,605	703,430	965,417
February	5,193,018	819,892	1,073,756
March	4,597,103	1,163,314	1,614,651
1922—			
January	4,174,000	2,055,000	1,597,000
February	4,691,000	2,084,000	1,562,000
March	5,183,286	2,645,790	2,073,963

	Inner Tubes		
1921—			
January	5,586,163	740,824	1,042,617
February	5,415,464	916,627	1,129,881
March	5,044,861	1,346,483	1,643,690
1922—			
January	5,247,000	2,343,000	1,890,000
February	6,142,000	2,597,000	1,703,000
March	6,991,118	3,017,511	2,090,737

	Solid Tires		
1921—			
January	303,753	21,220	29,116
February	304,374	23,365	29,599
March	283,800	28,710	43,926
1922—			
January	182,000	40,000	33,000
February	183,000	39,000	37,000
March	182,197	49,433	48,350

"Production" and "Shipments" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic work in factory and, in transit to, or at warehouses branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" includes only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

CLEVELAND DEALERS BUSY

Cleveland, May 20—Cleveland retail automobile dealers started off in the first two weeks of May with a volume of business that eclipsed that of the same period in April.

The prospects for the remaining two weeks of the month, are, as a rule, much better than they were for the closing weeks of the preceding month.

Wholesalers report that the farmers of Ohio who were feeling bad when prices for their products went down on the markets, are recovering again, and that they have commenced to buy. Not in the volume, however, that is expected when they harvest their crops and sell on markets that are much higher than they were when they hauled their 1921 crops to town. Farmers are buying fairly well now.

In the city of Cleveland, workers have been on the factory pay rolls long enough to get their debts paid up, and

the weather has lately taken a turn for the better. The sunshiny days and balmy breezes have had a great influence in turning Clevelanders into the retail automobile stores.

Foreclosure sales of cars are on the decrease, according to the reports of the clerks of the city and county courts, who keep a record of such matters. The loan companies, which finance most of the sales, report that purchasers on credit are paying better.

The popular priced cars are enjoying a great run of business, although Peerless, Jordan, Cadillac and Packard are going well also.

The Ford agencies here are enjoying the best run of business during May that they have had this year. The volume is running ahead of May a year ago.

Dealers Approve Club's Road Service Plan

DETROIT, May 22—The Detroit Automobile Dealers' Assn. has given its approval of the road service plan of the Detroit Club, which provides for emergency service to members experiencing trouble on the road. Official garages will be appointed to handle the work for the club. These will be located at strategic points in the city, making it possible for members to get assistance in few minutes, and will be garages independent of sales affiliations.

There will be no free repairs. Where a car will not start after minor adjustments it will be towed to a garage. The Club's responsibility is only to aid members with balky cars and all expenses for repairs will be paid to the garage owner. Calls for service will be made through the club office and the garage in the vicinity of the car will be instructed to take care of it. The plan is modeled after one now in use in St. Louis.

SALES LARGE IN CHARLOTTE

Charlotte, N. C., May 20—The automobile business in Charlotte is coming back strong. Such is the impression gained from talks with dealers during the past week. The public is again buying. Of course eager would-be owners are not lining up in front of the dealers' places of business waiting for the doors to open so that they can go in and deposit \$50 and wait six months on delivery as they once did, but dealers who are going after business are getting results and sales during the last two months have been surprisingly large.

TIRE DEALERS ORGANIZE

Portland, Ore., May 20—The Portland Tire Dealers' Assn., was formed here recently. Officers elected were: Jack Fletcher of Fletcher & James, president; A. L. Steele of the Western Tire Sales Co., vice-president; and Martin F. Swift of Howell-Swift Tire Co., secretary-treasurer.

Describes Special Field For the Electric Truck

Robert E. M. Cowie Points to Growing Place in Transportation

ATLANTIC CITY, May 20—A special field of service in the large cities for the electric truck was described by Robert E. M. Cowie, vice-president of the American Railway Express Co., in an address this week before a group of electric automobile representatives attending the convention of the National Electric Light Assn.

He said that for service in the cities his company had found that electric trucks were very satisfactory and that the company now operates 1194 electric street trucks and 250 electric industrial trucks. The company has bought new electric trucks each year since 1911, he said, and has purchased 123 this year. As to automobile transportation in general he said:

"The future of the motor vehicle is so great that it is hazardous to predict where it will stop. It is taking the place of transportation by rail to a very great extent, radiating from the great commercial centers for distances of from 100 to 200 miles. Perhaps the electric vehicle has not been used to any great extent for those distances, but it is shoving the gas car out into that service and reserving for itself what I call the in-field." He added that his company also used large numbers both gasoline trucks and horse-drawn vehicles.

BUS LINE 1,000 MILES LONG

Portland, Ore., May 20—Regular bus service has been established on the Pacific coast connecting the cities of Seattle, Portland and San Francisco, approximately 1,000 miles apart. Half a dozen big buses holding from 13 to 19 passengers each have been placed on the run, and schedules are arranged so that cars leave each city three times a week.

The service is designed, not as competition with the railroad, but as an outing or recreation feature, the trip by automobile being advertised as a scenic trip which cannot be duplicated anywhere. The trip takes four days, with daylight running only. An unusual feature is affiliation which has been made by the bus line with coastwise steamship lines, which enables a traveler to make the trip one way by the automobile stage line and return by steamboat.

MOON EXPORTS INCREASE

St. Louis, May 20—Export shipments of Moon automobiles in April were greater than in any month since July, 1920, according to E. H. Serrano, director of exports. The company is now exporting automobiles in quantity to Spain, Canada, Sweden, Canary Islands, Australia and Argentina.

Overland Production More Than 400 a Day; Sales Good

Increased Activity at Its Subsidiary Plants at Elmira, N. Y., and Pontiac, Mich.

TOLEDO, May 23—Increased activity in the subsidiary plants of the Willys-Overland Co. at Elmira, N. Y., and Pontiac, Mich., as well as at the main plant in Toledo, indicate an effort to bring production up to the sales and the demands of dealers.

Annual meetings of both subsidiaries were held last week, resulting in the election of C. B. Wilson, vice-president and general manager of the Willys-Overland Co., as president of the Willys-Morrow Co. at Elmira, N. Y., and of the Wilson Foundry & Machine Co. at Pontiac.

C. E. Killinger was elected vice-president and general manager of the Willys-Morrow Co., George R. Spencer is secretary, and H. C. Hobler, treasurer. Directors are H. L. Thompson, W. L. Milner, G. M. Mather, George M. Jones, L. A. Miller, all of Toledo, and Wilson and Killinger.

D. R. Wilson of Pontiac was elected vice-president and general manager of the Wilson Foundry & Machine Co., C. E. Killinger, treasurer, and E. W. MacKenzie, secretary. Directors are H. L. Thompson, W. L. Milner, G. M. Mather, George M. Jones and the two Wilsons.

The Willys-Overland Co. here reports that unfilled orders now on the books are equal in amount to those at the busiest period in the plant's history. Sales continue good.

Production is considerably more than 400 cars daily, and nearly 8,500 men are employed at the plant here.

WORK ON I. H. C. PLANT

Fort Wayne, Ind., May 20—Contracts involving more than \$500,000 have been let for the construction of the new International Harvester Co. truck plant east of this city, it has been announced by Day & Zimmerman, construction engineers in charge of the plant.

Excavation for the new plant will start immediately, according to the engineers. It is expected that the main body of the plant will be completed by the first of the year and that by the first of March, 1923, the plant will begin turning out trucks. There are about eight or nine other contracts still to be let for the construction and completion of the first unit of the plant which will cost about \$1,000,000. These additional contracts will be let within three or four weeks.

LINCOLN ALUMINUM BODIES

Detroit, May 22—The Lincoln Motor Co. will make first shipments of an all aluminum body touring car deluxe in June, the price on which has been fixed at \$3,800. The new model is a companion to the phaeton and roadster deluxe on which the company has been

in production since last summer, the price on which is also \$3,800. This line is independent of the regular production model, the price of which remains at \$3,300, as fixed immediately after the sale to the Ford interests.

Production at Lincoln factory is now approximately 30 cars daily, dependent on the receipt of materials and bodies. Henry Ford is spending much of his time at the Lincoln factory consulting with the Lelands, in whose hands the active management remains. Changes in the layout and arrangement of factory equipment is continuing and some new equipment is being added with an eye to facilitating output.

Horsepower Taxation Proposed by French Government

Paris, May 5—A horsepower formula for taxation purposes which will ignore engine speed has been proposed by the technical services of the French government. At present automobile taxation in France is largely based on horsepower, and the power is determined by a formula which takes account of bore, stroke, number of cylinders and number of revolutions. The real engine speed is difficult to determine. In some cases the maximum speed of the engine under load is taken and in other cases the authorities allow 1,200 revolutions as a good average. This causes wide variations in cars of equal piston displacement.

Under the new formula, horsepower will be calculated on piston displacement only, the basis being one horsepower for 12.2 cubic inches with a four-cylinder engine. When the engine has more than four cylinders, the horsepower will be calculated at the rate of one per 14.03 cubic inches. For twin cylinders, the rate will be one per 10.98 inches, and one per 9.15 inches for single cylinder engines. This basis only applies to passenger car engines, which are assumed to run, on an average, at 1,600 revolutions a minute. For truck engines, which always run at a slower speed, horsepower will be at the rate of one per 18.3 cubic inches, for a four-cylinder engine. For more than four cylinders, the rate will be one per 21 cubic inches of piston displacement.

NASH PASSES 100,000 MARK

Kenosha, Wis., May 23—The Nash Motors Co., which began production four years ago, announces that it recently passed the 100,000 mark in number of passenger cars turned out and that up to the middle of this month the total production was 104,245 cars. April was the company's best month and orders received up to May 15 were said to be 31 per cent in excess of the April orders.

A new body factory and general sheet metal working plant, 100x400 ft., three stories, costing \$250,000, will be erected immediately by the Nash Company, as a further extension of its Four Cylinder Car division at Milwaukee. The addition will be ready about Aug. 15 or Sept. 1, according to B. W. Twyman, general manager of the Four Cylinder division.

Wisconsin Factories Near 100 Per Cent Production

Bank Review Says Possibilities of Motor Transportation Just Beginning to Be Realized

MILWAUKEE, Wis., May 22—Continually increasing production, which is carrying passenger car factories to within 100 per cent of normal operations, and manufacturers of automotive parts and equipment to the limit of capacity to make deliveries according to specifications, is the distinct feature of the automotive industries at this time in the Milwaukee and Wisconsin district.

Testimony that the improvement up to this time has been real, and not in any wise artificial or fictitious, is adduced by the research experts of Milwaukee's largest bank, the First Wisconsin National, who, in the May number of "Business and Financial Comment," a monthly summary of local conditions issued by the bank, say:

"Automotive parts and accessories manufacturers continued to have good business during the past month. Employment in this group increased 5 to 10 per cent during the month of April, and this has been accentuated so far in May."

Motor Transport Advancing

The summary then takes a conservative view and says: "The seasonal nature of the automobile business, however, has to be taken into consideration. From about June 1, activity generally slows down, and starts up again in August. Despite the good showing of the automobile companies for the last two months, it is too early to assume that this will be a year of spectacular motor car production except for a few concerns."

Regarding the motor truck industry, the review says: "Production and sales of motor trucks have been making slower progress than is the case with passenger cars. On the other hand, however, the possibilities of passenger and freight transportation by motor bus or truck are just beginning to be realized. Heretofore the railroad and traction lines have occupied the field of mass transportation as distinguished from the individual service of the automobile. Now we appear to be coming into a period when, for distances within a radius of 100 miles, the truck and bus will to some extent supercede or supplant rail transportation."

TRUSTEE FOR TOWNSEND CO.

Janesville, Wis., May 22—Creditors of the Townsend Mfg. Co. of Janesville, Wis., manufacturer of tractors, have applied for a trusteeship to facilitate a reorganization. The concern will continue to operate in the meantime. A hearing will be held in the bankruptcy court at Madison, Wis., on May 26. Nolan & Nolan, Janesville attorneys, are representing the creditors.

IN THE RETAIL FIELD

Sherman Auto Co., Cumberland, Wis., Studebaker and Oakland dealer, has established a branch sales and maintenance station in Almena, Wis., occupying the former Ninesfeldt Garage. Arthur Etter is branch manager.

Paige-Ford Motor Co., Eau Claire, Wis., Paige and Jewett dealer, has opened a branch house at Chippewa Falls, Wis., under the management of Edward Schram. The branch will be operated under the name of Paige Sales and Service Station.

John Blanchard, Columbus, Wis., has been appointed Chevrolet dealer.

Cunningham-Buick Co., Burlington, Wis., has been incorporated with a capital stock of \$8,000 to deal in the Buick, conduct a garage, repairshop, etc. The incorporators are John C. and Arthur J. Cunningham and Edward W. Boller, all of Burlington.

Johnson Motor Co., Fond du Lac, Wis., has been appointed Studebaker dealer, this franchise recently having been relinquished by the Crescent Motor Co.

Lake City Automobile Co., Madison, Wis., is a new \$25,000 corporation organized by Boris, Sergei and Elizabeth Levitan to do a general automotive sales and maintenance business.

Christ Marten, Fond du Lac, Wis., has opened a general automotive maintenance station and repairshop.

Reinhold Ponath and George Fellows, partners conducting the Algema (Wis.) Auto Repair Works, have dissolved the firm, Ponath taking over the business.

Central Garage & Implement Co., Plymouth, Wis., has moved to its new display room, warehouse, office and service building. It features the International line of tractors and other farm equipment.

Century Tire Co. has opened a direct factory store at Milwaukee, Wis., in charge of E. A. Pauley.

Milwaukee Oldsmobile Sales Co., Milwaukee, is now occupying its new sales and maintenance building.

R. D. Rockstead, Milwaukee, Lexington distributor, has also taken the Earl.

Northwestern Petroleum Co., Appleton, Wis., capital stock, \$40,000, has been organized by James A. Wood, Thomas A. Gallagher and Daniel P. Steinberg, all of Appleton, to wholesale and retail petroleum products of all descriptions. It takes over the assets of the defunct concern of similar name and location.

Madden Co., Sheboygan, Wis., has been formed by G. R. LePage and E. R. Beyer, who have taken the Wisconsin distribution rights to the Madden waterproof rubber lustre, a new finishing material. A station is also being conducted.

Adams-Lauson Co., Racine, Wis., is a new \$15,000 corporation which will deal in the Chevrolet, with headquarters occupying the entire Lakeview Garage.

John W. Liso and Peter P. Lundemoe, La Crosse, Wis., have purchased the entire battery stock, charging and garage equipment of the Alfred James Foundry, La Crosse, and will continue the business as electrical and general automotive repairman, specializing in electric vehicle and battery recharging and maintenance.

Bachman Motor Co., Milwaukee, distributor of the Dort, expects to move June 1 into its new sales and maintenance building, erected and equipped at a cost of \$125,000. It is 120 ft. square, one story and part basement, of fireproof construction.

Olson & Pauly Auto Co., Milwaukee, distributor of the Winton and Holmes, has incorporated its business with \$75,000 capital.

Hamacheck-Bleser Buick Co., Manitowoc, Wis., has broken ground for a new sales and maintenance building, 50x100 ft., part two stories and basement. The repairshop will be 40x40 ft. The building, with complete equipment, will cost \$45,000.

H. H. Brandenburg, Manitowoc, Wis., is erecting a one-story building, 50x120 ft., adjoining the H. M. S. garage. It will be equipped exclusively for motor vehicle painting and will include enameling ovens and other modern equipment.

Harry A. White, Marinette, Wis., has let contracts for the erection of a one-story fireproof garage, 109x117 ft., to cost about \$45,000 completely equipped.

Thompson-Drake Auto Co., Ladysmith, Wis., has started work on a new \$20,000 sales building.

John Everson, Eau Claire, Wis., is erecting a one-story sales and service building, 50x65 ft., with part second floor and basement.

Lindsay-McMillan Co., Milwaukee, wholesale distributor of petroleum products, is enlarging its main warehouse by a two-story addition, 40x110 ft.

William F. Clark, Madison, Wis., has plans by A. E. Small, local architect, for a public garage, repairshop, filling station, etc., estimated to cost \$35,000 complete.

Arrow Motor Service Co., New Orleans, La., owned by Hamilton Barton, is now agent for the Pierce-Arrow in New Orleans. Barton was president of the Barton Motors Company, Inc., which went into bankruptcy.

Carleton Motor Co., Davenport, Iowa, has taken over agency for the Lexington cars. It also represents the Gardner car and Republic truck in this territory.

George W. Peak, Peoria, Ill., distributor of the Haynes car, has opened a new sales agency which was formerly occupied by the Kelly Motor Accessory Co. He will also distribute the Columbia car.

W. V. Galford, Bloomington, Ill., for many years distributor of the Cadillac car in the central Illinois territory, has added the Durant line, the first dealer in that section to receive this appointment.

B. F. Powers Motor Co., which distributes the Auburn and Gardner cars in the northwest, has established new headquarters. These cars will be distributed from both of the Twin City sales departments.

Weldon Garage, Greenfield, Mass., reports that its business for April exceeded that of any previous month in its history, going ahead of March, which had broken the record up to that time. Fred W. Tirrell of this concern won the New England salesmanship contest on the sale of Nash cars during March and April.

Cooper Tire & Rubber Corp. has appointed the Hampden Rubber Co., Springfield, as its sales representative for Western Massachusetts.

and is an increase of more than 750 over the March sales.

Dallas dealers reported sales running a little more than 100 a day, an increase of 10 per cent over March. The sales at Houston are indicative of those in South Texas generally. Galveston was reporting about the same increase and so was San Antonio. Dallas retail sales reflected the general business in North Texas. Ft. Worth continued to show increase in business. So did Denton, Sherman, Denison and Wichita Falls.

PAIGE PRICES NOT CHANGED

Prices of the 3 and 4 passenger models of the Paige car continue at \$2495 and \$2245, respectively, no revisions having been made as was stated in the May 11 issue of MOTOR AGE.

Export Business of General Motors Running Over Forecast

Foreign Demand for All General Motors Cars Said to be Unusually Strong

NEW YORK, May 20—Good conditions in export business were reported by Pierre S. duPont, president of General Motors Corp., upon his return from an inspection trip of the plants of General Motors of Canada, Ltd., at Oshawa and Walkerville, Ont., in company with other officials of the corporation. In speaking of conditions, duPont said:

"The corporation is developing in its Canadian plants a line of export models which meet the requirements of foreign countries in the matter of taxation, fuel consumption, weight, tire mileage and economical upkeep, which are major considerations in influencing the purchasing of American products in foreign countries.

"The export business of the corporation is running three times what it was forecast six months ago. Recently a solid trainload of automobiles left for St. John, N. B., whence they will be shipped to General Motors, Ltd., our English subsidiary, for distribution in Great Britain. In this one shipment there were 315 passenger cars. The value was \$320,000 and transportation charges \$40,000.

"The foreign demand for all General Motors cars is strong, especially Buick and Chevrolet. In the three and a half months from Jan. 1 to the middle of April the total shipments of all General Motors cars from the factories of General Motors of Canada were 10,126 compared with 4,102 cars in the corresponding period of 1921."

IMPROVEMENT IN WEST

Omaha, Neb., May 20—O. A. Wilson, salesmanager of Andrew Murphy & Son, Durant distributors in this territory, who has just returned from a trip through the western territory, declares the business in automobiles is fast improving and the outlook is great.

The company states it has placed 43 Durant dealers since the show, held March 15, and that all the territory between Omaha and North Platte along the Union Pacific is now closed.

NEBRASKA MEMBERSHIP DRIVE

Omaha, Neb., May 22—The Nebraska Automobile Assn. is about to launch an active membership campaign in every county in the state. Twenty-five agents of the association are touring the state, procuring the services of local men to represent the association as district agents and establishing information bureaus for tourists. Hotels, garages and tire shops are being investigated by these agents and those that comply with the standards set by the association are allowed to affiliate with it as dealer members.

Texas April Sales Show 10 Per Cent Increase Over March

Dallas, Tex., May 20—There was an increase in retail sales of automobiles in Texas during the month of April as compared with that of March. Figures from various cities in the state indicate the increase for all Texas was about 10 per cent. The biggest increase was shown in South Texas. Taking that section as a whole, the increase was about 20 per cent.

In North Texas the increase was about 10 per cent. West Texas was normal and there was a slight decrease in East Texas.

Houston dealers reported sales amounted to 3,750 in April. That was considerably more than 100 cars a day

BUSINESS NOTES

Parmenter Co., automobile parts distributors at Springfield, Mass., has arranged to occupy a much larger store in a building now being remodelled for the purpose. This concern will continue to cover a large section of Western New England as representative of the Campbell Motors Corp., and also expects to act as dealer for a popular priced car.

Franklin Holyoke Corp. has been formed with capital of \$25,000, to sell the Franklin car in Holyoke, Mass.

Chicopee Motor Sales Co. has been formed with \$15,000 capital, to deal in automobile accessories in Chicopee, Mass.

Blue Ribbon Motor Sales, Inc., Springfield, Mass., has appointed these sub-dealers for the Gardner car: Easthampton Auto Supply Co., Easthampton, Mass.; John Green, Amherst, Mass.

Charles H. Barrett, Pittsfield, Mass., has occupied larger quarters for his maintenance station for Willys-Knight and Overland cars.

Mutual Service Stations Co., Geneseo, Ill., operating stations at seven communities in this vicinity held a "booster" meeting, at which plans for the future and sales talks were given. Joseph L. Shaw, president, and Frank W. Butler, general business manager, were among the diners.

Triangle Motor Sales Co., Springfield, Ill., recently taken over by Col. James W. Jefferson, will soon build a 90-foot addition to its present building. It will be a commodious sales and display room and the old building converted into a service station. The Triangle has just secured territory agency for the Hudson-Essex cars.

Dwight H. Denmead, Marshalltown, Iowa, has been elected president of the Marshall County (Iowa) Motor Trades Bureau, and other officers are: Lloyd Edson, vice-president; E. N. Edsall, secretary-treasurer. These, with R. A. Sweet, State Center; S. M. Small, Liscomb; Frank Diggins, Melbourne; H. D. Stewart, Gilman; A. L. McIntyre, Albion; G. W. Grinstead, Clemons, and Mrs. A. F. Snowgren, Rhodes, comprise the directors.

Mason Tire & Rubber Co., factory branch, Akron, Ohio, has been opened at Cedar Rapids, Iowa, for the eastern Iowa territory. H. L. Jackson is sales manager and H. R. Reif, office manager. Jeffrey Tire Co. will continue as local dealer.

U. S. Indestructible Gasket Co., New York, announces the consolidation of its executive, manufacturing and warehouse departments and its removal to Brooklyn.

Batavia Rubber Co., Batavia, N. Y., manufacturer of the Batavia tire, has been placed in the hands of former Supreme Court Justice John Woodward of New York as receiver. This is the second time a receiver has been appointed, but the last time the creditors were paid off in full with interest. It is stated that the receiver has power to either sell the plant or to continue to operate it. Ernest F. Kling, general manager, is of the opinion that the plant will continue.

Auto Electric Service Corp., Omaha, has been expanding rapidly and now has installed a complete radio department. The name of the corporation has been changed to Auto Electric Service and Radio Corp.

Glasco Co., Chicago, is seeking distributors to handle Glasco visors equipped with Houze transparent colored glass. The Glasco company also distributes the Houze glass in various colors.

Duncan Truck Body Works has completed the erection of a modern brick factory at New Orleans. The concern plans shortly to begin distribution throughout Louisiana, Mississippi and Arkansas, according to James H. Duncan, head of the company. A feature of the company's business which is proving popular with buyers of truck bodies is that a customer desiring any special color for his body may obtain it without extra charge, thus making further expenditures to obtain the color to meet special requirements unnecessary. A fully equipped repair department is maintained.

Bunker Hill Transportation Co., Waterbury, Conn., has incorporated with an authorized capital stock of \$50,000. Incorporators are Raymond A. Dutton, Dora H. Dutton, William J. Sansom and Mabel E. Sansom.

Oldsmobile Co., New Britain, Inc., has organized, with A. L. Rothschild as president and treasurer; W. H. Fuller, vice-president; secretary, P. S. Clark.

Capital Storage Battery Co., Columbia, S. C., capitalized at \$40,000, has begun business. Vulcanizing, battery work, electrical work and all kinds of repair work will be done and accessories will be carried. G. R. McNeill is manager of the new business.

Dutee Wilcox Flint, Inc., Bridgeport, Conn., operating thirty Ford stores and maintenance stations in Connecticut and Rhode Island, has added the Lincoln car to its line of Ford products. Another announcement made by the Flint Corp. concerns the expansion of its field of activity. Arrangements have just been completed for establishing Ford car agencies by the concern in London, Paris, Madrid, Stockholm, Copenhagen and Marseilles.

Powell Supply Co., Omaha, Neb., has increased its traveling sales force.

Panyard Ring and Supply Co., Cedar Rapids, Iowa, has introduced a new piston ring. Feature of its construction is the three-way pressure: outward against the cylinder walls, and up and down against the sides of the ring groove. F. C. Bossert is manager of the distributing branch.

Acme Body-Top Co., Aurora, Ill., has been organized with capital stock of \$3,000, to manufacture in that city various kinds of motor accessories, including tops and bodies. The incorporators include Henry G. Benson, H. M. Gustafson and S. G. Gustafson.

Flex-Edge Valve Co., Chicago, has removed to Pontiac, Ill., and will engage in the manufacture of valves for motor vehicle motors. Frank S. Shaw is the principal owner of the company.

James Tarr, Moline, Ill., has been appointed distributor in Rock Island and Mercer counties, Ill., for the Moon car, and has opened a sales agency and service station at 829 Eighteenth Street. Tarr was for many years connected with the Velie Motors Corp., three years in charge of tests, and for seven years in the service and repair department.

Roher & Michael, Pekin, Ill., operating the Pekin Ford Motor Co., have outgrown their present quarters and have commenced the erection of a modern plant. It is also announced that the Dodge Bros. distributors at Pekin, have purchased a tract and will shortly break ground for a modern building.

Missouri Avenue Auto Service Co. has been organized at East St. Louis, Ill., and will open a garage, sales agency and accessory store. The promoters include A. J. Leibinger, R. W. Kessler and J. A. Losh.

Southern Stutz Sales Co., New Orleans, La., has turned its assets over to its creditors and closed up.

Tennant Brothers, automobile bankers, Chicago, have opened a new outlying branch. C. C. Schroeder has been appointed resident manager. This action on Tennant Brothers' part will indicate the wonderful growth of the outlying districts around Chicago as sales fields for automobiles.

Safety First Auto Equipment Co., Akron, Ohio, has been incorporated for \$75,000 to manufacture the Safety First Auto Signal and other automobile accessories and equipment. The officers are: President and general manager, C. A. Mitten; vice-president, E. C. Allen; secretary and treasurer, L. D. Cornell.

Hartford Automobile Parts Co., Hartford, Conn., creditors who bid in the property for \$350,000 at the recent sale, announce that the Spicer Manufacturing Co. has offered to purchase all the assets and property except the real estate and the buildings and the outstanding accounts receivable. The Spicer Manufacturing Co. will organize a new corporation and will pay \$220,000 in cash to the creditors' committee.

Studebaker-Wulff Rubber Co., Marion, Ohio, has received an order from the Stewart Oil Co. of Macon, Ga., who distribute throughout the state of Georgia. This order calls for fifty casings and sixty inner tubes per day for one year from May 1, 1922. This amounts to a total of more than 15,000 casings and 18,000 tubes.

Goodyear Tire and Rubber Co. of Canada has issued a report for the half-year ending March 31. The company shows a net profit of \$251,294 earned in the period. This was reached after reserve of \$204,328 had been set aside for depreciation of plant, and before valuation of inventories on the basis of the latest cost or market prices.

Capitol Motors Corp. Building at Tiverton, Mass., has been sold to Edward Newton of Fall River, treasurer of the Barnard Manufacturing Co. The corporation formerly was engaged in manufacturing Capitol trucks, but recently went into bankruptcy. The sale does not include the machinery.

Peerless Motor Car Co. of Illinois has been established at Chicago as a factory branch of the Peerless Motor Car Co. of Cleveland. C. A. Englebeck is manager of the Chicago company.

New Sterling-Knight to Start Production Soon in Ohio

Cleveland Plant to Produce Work of C. Y. Knight. Car in High-Priced Class

CLEVELAND, May 20—Phillip H. Withington, president of the Sterling-Knight Motor Co., announced here that production of the new Sterling-Knight car would start immediately in the new plant here, which is in the center of the automobile manufacturing district of the city.

C. Y. Knight, inventor and designer of the Knight motor, visited the plant last week, looked over the plant, and then ordered the first car that will be turned out from the plant.

Back of the new car is the idea that there is a big market in this country and the world, for that matter, for a finer type six cylinder car, equipped with a Knight motor, than is now to be had from an American automobile factory. The new car is in the class with the Rolls-Royce, Daimler-Knight, Mercedes-Knight, Minerva-Knight and Panhard-Knight.

The development of the car followed a series of experiments by J. G. Sterling, an experienced Knight motor engineer, since 1919. He was financed by a group of well known business men, who paid into a syndicate \$250,000. The Sterling-Knight is a powerful and highly developed six cylinder car. Its six cylindered engine—3¼ in. bore by 5¼ in. stroke, rating 33½ h. p.—develops over 75 brake horse power at 2,200 r. p. m.

MOTOR WHEEL INCREASE

Detroit, May 22—The Motor Wheel Corp. is employing 1800 men as compared with 800 two months ago and is working many of its departments three shifts. The rim department at the Prudden unit is on a 24-hour basis and the machining department at the Auto Wheel unit is on the same schedule.

Quigley & Kelly have bought the Elm Garage at Holyoke, Mass.

Norcross-Cameron Co., handling Chalmers and Peerless cars and White trucks in Springfield, Mass., will erect a large service building at the south end of the town, on the main route to Hartford, where several large agencies have located. Its present establishment in the heart of the business district will be retained for a sales building.

Moon Motors, Inc., is to be represented in Springfield, Mass., by Herbert W. Mathews, formerly with the Moon company in Boston. With him will be associated his father, Harry V. Mathews.

R. H. Long Co. has opened a branch in Pittsfield, Mass., for the sale of the Bay State car.

Amherst Garage, Amherst, Mass., is building an extension to its quarters, to be used for storing cars.

Safety Device Manufacturing Co., St. Paul, has begun making for national distribution the "Watch Dog" automobile signal. It acts as a signal and tail light automatically, showing just what the driver of the car is going to do.

Columbia Minnesota Motors, Inc., has been formed and opened a sales and maintenance station at Minneapolis, and will distribute the Columbia from St. Paul and Minneapolis throughout Minnesota. Henry Appel is president and treasurer, J. H. Greeves is vice-president and general manager, and Mauric Schuman, secretary.

CONCERNING MEN YOU KNOW

G. C. Jefferson has resigned as assistant advertising manager of Earl Motors, Inc., Jackson, Mich., and has joined the western staff of Grandin-Dorrance-Sullivan, Inc. He will make his headquarters at the new South Bend, Ind., office which Grandin-Dorrance-Sullivan, Inc., has just established to handle the advertising account of the Studebaker Corp. of America.

Marvin E. Monk has been appointed assistant salesmanager in charge of general sales of the U. S. Ball Bearing Manufacturing Co. of Chicago. Monk was formerly special sales engineer for Manning, Maxwell and Moore, Inc., New York City.

Ward Lederer, manager of the Springfield Durant Co., Springfield, Mass., is going west for an extended stay for his health. George R. Morris, factory representative for Durant Motors, is temporarily in charge.

W. H. Wilson has been appointed works manager of the Prudden plant of the Motor Wheel Corp. at Lansing, Mich.

George J. Feeney, of Syracuse, N. Y., who was formerly with the Franklin Automobile Co., in the engineering and experimental departments, has moved to Springfield, Ohio, and taken charge of the Franklin service for B. G. Garver & Co. Feeney brought with him E. A. DeVine, who will assist him with the work.

F. A. Burgess, president of the Burgess-Norton Manufacturing Co., Geneva, Ill., manufacturer of B-R piston pins, died suddenly from heart disease May 14, at his home in Geneva.

George White, assistant purchasing manager at the Packard Motor Car Co., has been made manager of that department, succeeding F. W. Boynton, who has resigned to join the Anderson Motor Car Co. in an executive capacity.

President H. S. Berlin, of the Victor Rubber Co., Springfield, Ohio, upon his return from a visit to the branches and various cities in the southwest, stated that he and H. A. Grubb, sales manager, found conditions very encouraging. "Things are improving in the central west and the southwest," said he. "We have just returned from a trip to Chicago and the southwest, including Kansas, Texas, Oklahoma, the oil country and the wheat belt. Weather conditions have been trying lately, but now there is an improvement. As a result, there is an increasing demand for rubber tires."

Walter P. Burn, who was formerly assistant sales promotion and advertising manager of the Tide Water Oil Co., New York City, has been appointed sales promotion and advertising manager of the Transcontinental Oil Co., Pittsburgh, Pa., succeeding E. D. Mason.

SPEED CONTROL DEVICE

Spokane, Wash., May 22—A speed control device for the use on automobiles is to be manufactured in Spokane by the Speed Control Co., Inc., which has just been granted articles of incorporation by the secretary of state. This company, which is authorized to issue capital stock for \$500,000, will manufacture and sell a speed control device which is already being used on three cars here.

"The device, which is the invention of Giles F. Spiva will control the speed of any car on the market today," said Freeman Jensen, one of the incorporators. "It is attached to the wheel in the same manner as a speedometer and when the car attains a certain speed the device automatically disconnects the ignition. Then when the car slows down the ignition is again connected. The maximum speed desired can be attained by simply setting the speed control at the figure required, from 20 miles an hour upward."

USED CAR MARKET SUCCEEDS

Fort Wayne, Ind., May 23—It is stated that since the inauguration of the used car market here in which twenty-two local dealers cooperate, the used car situation in this territory has cleared won-

derfully. At the beginning of the year the dealers were nearly all over-stocked with used cars, but most of these cars have now been worked out and the dealers face the new season in the best of condition.

Elwood Haynes, inventor and designer of the Haynes automobile and president of the Haynes Automobile Co., has been awarded the John Scott medal, certificate and premium "for his discoveries in stainless steel, stellite and chrome iron." Announcement of the award was made recently by Worcester Polytechnic Institute, from which Haynes was graduated in 1881. The fund from which the award is made, yielding now about \$800, was left to the corporation of Philadelphia by the will of John Scott of Edinburgh, dated April 2, 1816. The award is made for inventions which "add to the comfort, welfare and happiness of mankind."

S. C. Mitchell, Birmingham, Ala., district manager of the Dort Motor Car Co., spent several days in Birmingham last week, making his headquarters at the Scouten Motor Co., local Dort distributors.

W. W. Clark, for many years export manager for the Hart-Parr Co., tractor manufacturers, Charles City, Iowa, has started a wholesale importing business with headquarters in this city, where a retail sales display rooms will also be opened soon.

Charles S. Crawford, who for many years has been identified with the Cole Motor Co. as chief engineer, has just been appointed chief engineer of the Stutz Motor Car Co. and has assumed his new position. Crawford was chief engineer of the Cole concern for seven years, and later became chief engineer and vice-president of the Premier Motors Corp. Later he conducted a consulting engineering business here, and not long ago went back to Cole as chief engineer.

Fred L. Rockelman, who has been general manager of the Indianapolis branch of the Ford Motor Co. for three years, has been appointed general manager of Ford's Detroit, Toledo & Ironton Railroad, and will take charge of the line, with headquarters in Detroit, at once. Friday evening of last week 300 Ford dealers of Indiana tendered Rockelman a banquet and presented him with a \$5,000 Lincoln. George P. Steinmetz, who has been Rockelman's assistant here, will head the Ford organization temporarily, it is said.

A. D. Kimball has been made manager of the Detroit territory for the Schebler Carburetor and will have charge of factory sales in the vicinity of Detroit and in the state of Michigan. Kimball was formerly connected with Ball & Ball Carburetor, and before that was engineer of the Fulton Truck Company.

William J. Shea, formerly central district manager of the Portage Rubber Co., has been appointed salesmanager of the Amazon Rubber Co.

LINCOLN VERY BUSY

Detroit, May 24—Lincoln Motor Co. reports enough business on hand to operate the factory at capacity for three months. Orders are reported to be coming in three times faster than the factory can produce them. Special efforts are being made by officials to improve on the time required to build the car and much special equipment is being added. It is hoped within a short time to have production at 40 to 50 a day which will be the maximum.

DECIDED GAIN IN INDUSTRY

Washington, May 19—One of the outstanding developments of the general business and financial situation during the month of April was the very decided gain shown by the automobile trade, according to a review issued by the Federal Reserve Board. The Board regards the March output both in trucks and passenger cars as a hopeful sign.

Committee of U. S. Senate to Investigate New Gasoline Price

Senator McKellar, Author of Bill Which Authorizes Inquiry Into Raise

WASHINGTON, May 20—Increase in the price of gasoline amounting to 4 cents in many sections of the country has lead to a move for an investigation by the United States Senate. A resolution sponsored by Senator McKellar, of Tennessee, was adopted and provides for an inquiry by the Committee of Manufacturers, of which Senator La Follette of Wisconsin is Chairman. Senator McKellar is of the opinion that there is some agreement or understanding about the price advance and the inquiry is made for the purpose of determining the responsibility for the price advances.

Simultaneous with the introduction of the McKellar Resolution, the Bureau of Mines announced that the production of refineries showed an increase in March of 3 per cent over the month of February. Data gathered by the Federal Government shows that the present stocks of gasoline amount to 854,232,000 gallons, which is 20 per cent greater than for April 1 last year and 36 per cent greater than for April 1, 1920. Domestic consumption of gasoline shows an increase of 7 per cent over the first quarter of 1921 and 25 per cent over the first quarter of 1920.

Exports and shipments are the only figures for the past three months that do not show material increases over those of previous years. The daily average output of gasoline for March amounted to 35,234,770 gallons, as compared with a daily average of 13,541,787 for the same month last year. The total production of gasoline during March amounted to 472,277,870 gallons.

The daily average production of lubricating oil during March, 1922, amounted to 2,367,460 gallons, as compared with 2,354,945 gallons for the same month last year. The present reserve of lubricating oil is 236,886,000 gallons.

THE 1000TH RICKENBACKER

Detroit, May 20—The 1000th Rickenbacker automobile was completed at the factory here May 10 and the event was celebrated with considerable ceremony. B. F. Everitt, president of the Rickenbacker company, and Mrs. Everitt were passengers in the car on its test run. They were accompanied by Charles Kaar, San Francisco distributor, who wanted the car included in his allotment. Henry L. Cunningham, Michigan distributor, also wanted the car and it was decided to toss a coin. Kaar won. The company is trying to increase production to 50 cars a day. The average has been 30 a day.

HAYNES "75" REDUCED

Kokomo, Ind., May 22—The Haynes Automobile Co. has reduced the price of its model 75 two-passenger roadster from \$2595 to \$2395.

The READERS' CLEARING HOUSE

Questions & Answers on Dealers' Problems

Too Much Display Space Crowds Other Sections

PLAN NO. 401

Q—I am sending herewith a small sketch of a garage I am going to build as soon as possible and I ask you to kindly give me some assistance in laying out the plans for same.

The building will be 100 ft. front with a depth of 59 ft. 2 in. at one end and 67 ft. at the other end and I want an office with a small private office and a sales-room large enough to display four or five cars with a women's washroom, etc., and a repair shop large enough to hold three or four cars and a wash space to wash cars.

I want this garage to have a basement large enough to hold a carload of coal and oil room in the basement large enough to hold several barrels of oil. I do not want to build an expensive garage and at the same time I want a good substantial fireproof building of brick and tile.

In looking at the sketch you will see that I have two streets and one alley, which ought to give me plenty of exits so that the transient cars that come in for storage overnight can get out without moving other cars.—H. A. White, Marinette, Wis.

Your request for showroom space for four or five cars is rather hard on the other departments and is quite unusual in a building of this size. It is a good fault, however, for there is nothing that clinches the sale of a car quicker than the car itself on the floor all ready to be driven away. The garage would store four additional cars if the show-

The Readers' Clearing House

THIS department is conducted to assist dealers and maintenance station executives in the solution of their problems.

In addressing this department, readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been made and these are answered by reference to previous issues.

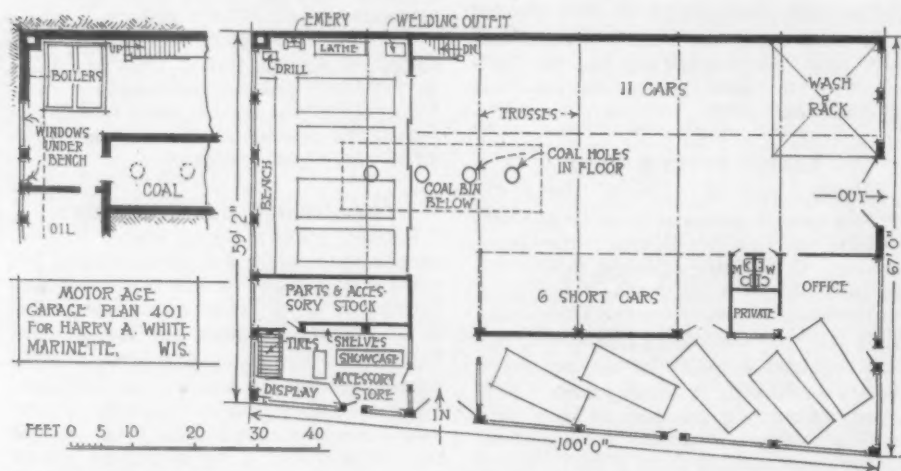
Inquiries not of general interest will be answered by personal letter only. Emergency questions will be replied to by letter or telegram.

Addresses of business firms will not be published in this department but will be supplied by letter.

Technical questions answered by B. M. Ikert and P. L. Dumas; Legal, by Wellington Gustin; Paint, by G. King Franklin; Architectural, by Tom Wilder; Tires, by a Practical Tire Man; General Business questions, by MOTOR AGE organization in conference.

room and office could be confined to the strip across the front.

The best location for the basement is under the shop where the boilers are handy for one of the mechanics to tend. A good arrangement for the coal storage bin is under the center of the garage



The display room for 4 or 5 cars as requested in this plan somewhat crowds the other departments

Architectural Service

IN giving architectural advice, MOTOR AGE aims to assist its readers in their problems of planning, building and equipping maintenance stations, filling stations, and, in fact, any building necessary to automotive activity.

When making request for assistance, please see that we have all the data necessary to an intelli-

gent handling of the job. Among other things, we need such information as follows:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

And how much of an accessory department is anticipated.

with coal holes in the floor for filling.

By this arrangement the coal may all be dumped without any handling and the bin will hold a little more than a carload, so that a carload may be put in before the last lot is entirely exhausted.

SELLING 1919 MOON CAR AS 1920 MODEL

Let me know through your Clearing House department if I can sell a Moon car bought in September 1919 as a 1920 model.—A reader.

Fraud consists in misrepresenting a material fact for the purpose of getting another to act thereon, and when that other does act thereon to his damage he may either recover damages or rescind the contract. Now you may answer your own question by determining whether as a matter of fact the car is a 1920 model, and whether the statement is made to and does induce the sale of the car.

If your statement that the car is a 1920 model aids materially in inducing the sale, and it is in fact a 1919 model, but unknown to your purchaser who did rely and had the right to rely on your statement that it was a 1920 model, then the buyer may recover damages from you.

NUMBER OF MILES ON GALLON OF GASOLINE

Q—I would like to know about the average number of miles you can get from a gallon of gasoline from the following cars:

Hudson Super Six, four passenger, touring, Haynes 55, touring, Chandler, touring, Nash 6, five passenger touring, Studebaker Special Six, five passenger touring, Buick 6, Special, five passenger touring, Dodge, five passenger touring, all cars referred to are 1922 models.—J. A. Bueker, Dayton, O.

The following figures have been supplied to use by the Chicago distributors of the above named cars, and they are considered the approximate average. However some of these cars will show as high as five miles per gallon above this under ideal conditions. Hudson Super Six, 13 to 15 m. p. gal. Haynes 55, 12 to 13 m. p. gal. Chandler 12 to 14 m. p. gal. Nash 6, 13 to 14 m. p. gal. Studebaker Spec. Six, 14 m. p. gal. Buick 6, 16 to 18 m. p. gal., and Dodge 16 to 25 m. p. gal.

The Dodge figures show the extreme limit of the gasoline mileage obtained, 16 being the mileage secured in a large city where starting and stopping is engaged in frequently. The other figures pertain to the average driving and we would state that where these cars are used on long drives and by careful handling of the car and carburetor that the mileage obtained will show an increase of as much as 20 per cent over the low figures.

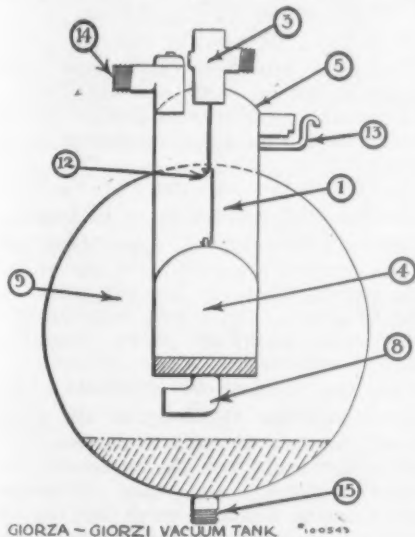
Description of Maxwell Fuel System

Q—Supply address of company that makes the Mossberg tool sets.

1—The Mossberg wrenches are made by the Frank Mossberg Co., Attleboro, Mass.

2—What company makes the vacuum tanks on the new Maxwell? Give a description.

2—The fuel system used on the new series Maxwell is known as the Giorza-Glorzi fuel system and is manufactured by the Giorza Corporation, New York



City. A sketch of this system is shown above. Its action is as follows:

With the rotation of the engine a partial vacuum is created in the inner chamber of the vacuum tank by means of a small pipe connected to the intake manifold. This vacuum is communicated through vacuum tank valve No. 14 to the gasoline tank in the rear of the car. This causes the fuel to be forced by suction into the inner chamber of the vacuum system.

When the gasoline reaches the level 12 the valve 3 is automatically closed by the action of the float 4. The suction of the engine having been thus temporarily eliminated, normal or atmospheric pressure is established in the inner chamber 1 by means of air entering the small permanent vent 5. The weight of the gasoline when the suction is removed opens the lower valve 8 allowing the gasoline to flow rapidly into the outer chamber or storage reservoir 9.

The latter is independent of any suction of the engine and functions merely as a storage tank supplying the gasoline by gravity to the carburetor 13 is a breathing pipe for the reservoir, 14 is the line to the main gasoline tank in the rear of the car and 15 is the line to the carburetor.

3—What is your opinion of the sliding gear attachments for Ford cars or trucks? Give names of companies that make them.

3—This will be answered by letter.

4—Would advancing camshaft gear one

tooth on Dodge affect the slow speed of car?—Lester Baines, Cressey, Mich.

4—Advancing camshaft one tooth will cause erratic running at low speeds. If the car is to be used for stock purposes and not for racing we would strongly advise against changing the factory timing.

PROPER GEARING FOR HISPANO-SULIZA FOUND BY EXPERIMENT

Q—We are about to install a Hispano-Suliza Peugeot made airplane engine of 220 h. p. at 2200 r. p. m. and wish your advice on the following:

What gear ratio would be best with 34 inch wheels in order that greatest speed may be obtained? The engine will turn up 2800 but the peak of power is at 2200. The rise of power curve is very abrupt. The chassis is chain driven as the shaft drive will not stand up under the abrupt acceleration. Will it stand a one to one gearing?

What weight and diameter of flywheel would be best for speed purposes? Would prefer to use one of a standard make which has been used. Also what kind and make of clutch? A Packard 6-48 flywheel and clutch has been used on a Renault 300 h. p. aviation engine with good results. Would this be best for the Hispano 220?

The engine is of the geared down type 2 to 1. The gearing, of course, will be removed and a flywheel flange fitted to the taper end of the crankshaft in place of one of the gears. This will necessitate a plate being used in lieu of the gear housing and an oil retainer made up for the flywheel flange to run through. Submit a sketch of the whole alteration. —S. N. Poulterer, Philadelphia, Pa.

1—Proper gear ratio for any car or engine cannot be selected by any method of calculation with any degree of accuracy. The type of work this car is called upon to do will determine the proper ratio. It is possible to install a one to one gearing on this engine but you will find it will have very little power and it would be good only for very smooth roads or beach sprints. We would advise that you first try one and one-half to one gear ratio on this chassis. The $1\frac{1}{2}$ ratio and a speed of 2200 r. p. m. would give you the theoretical speed of 123 m. p. h. At least two sets of gears are always built when designing a speedcar because only an actual tryout will show which is best.

The Packard 648 flywheel would be too heavy for this engine for speed work. We know of one installation where the Stearns Knight 8 flywheel was used on a Hall Scott engine with very good success. On the installation referred to the Hele-Shaw clutch was used. The Hele-Shaw clutch is built in all sizes up to 300 h. p. and as it is manufactured in your own town we would advise that you communicate with them regarding the model best suited for this engine, and would advise that you also consult with them in regard to securing a flywheel because the diameter of this clutch is unusually large and has a pronounced flywheel effect so that with this a lighter flywheel is necessary than ordinarily would be used. The Hele-Shaw clutch is made by Merchant & Evans, 2035 Washington Ave., Philadelphia.

We have been unable to locate a drawing of this engine and are therefore, unable to suggest the layout for the proposed change.

REMOVING PISTONS FROM HUDSON SUPER-SIX

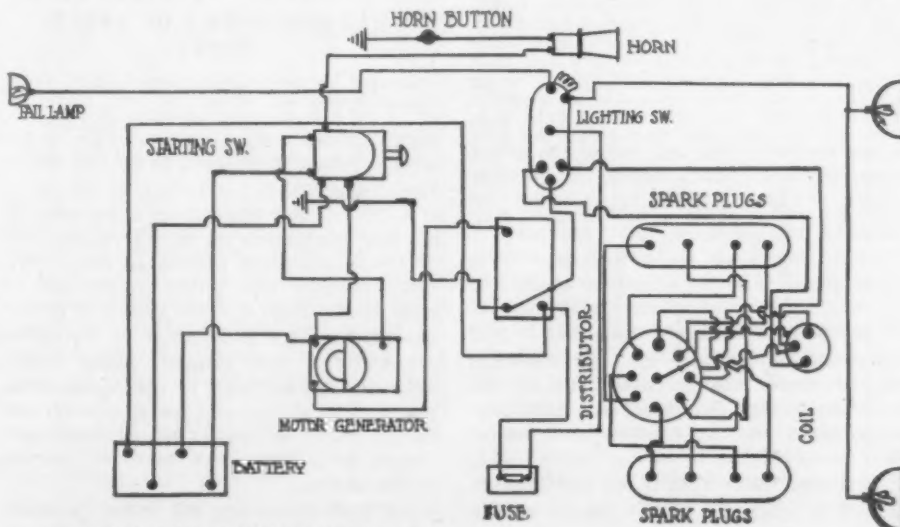
Q—Explain the proper method of removing the pistons from Hudson "Super Six" model O. Is it advisable to remove the crankshaft counterweights if they interfere in removing the piston from below and does the connecting rod bearing interfere with the removal from above by being too large to pass through cylinders?—A. Reader, Macomb, Ill.

The correct way to remove Hudson piston is to remove the cylinder head and draw the pistons out through the top. There is sufficient diameter to the cylinder bore to allow the connecting rod bearings to pass through. Under no consideration should the crankshaft counterweights be removed.

WIRING DIAGRAM OF 1916 BRISCOE

Publish wiring diagram of 1916 3-cylinder Briscoe showing the single unit starter and generator connections.—P. V. Dawson, San Rafael, Calif.

Diagram per your request is shown below.



Mechanical Condition of Starter Affects Torque

Q—Why does the torque of type M Auto-Lite starting motor such as used on Chevrolet 490, fall off as the rear bushing wears?

1—It is our opinion that the torque on any starting motor having plain bearings is likely to decrease with wear due to the fact that the armature will be allowed to draw nearer to one pole piece than to some other pole piece and the enormous magnetic action of the field winding will produce enough additional friction at the bearings to appreciably affect the power output.

New Bushing Sometimes Fails

2—Why does replacing of this bushing sometimes correct the trouble and sometimes fail to do so? We had such an experience with a Chevrolet 490, the owner of which purchased from us a battery which although in perfect condition would not operate the starter except very slowly. A thorough examination of the starting system showed everything all right except the rear bushing of the starting motor which was loose on the shaft.

This bushing was replaced without appreciably improving the operating of the starter. In checking the starter circuits electrically it was found that the battery was in good condition, the gravity of the cells being 1225 in one cell, 1225 in another and 1230 in the last cell.

Condition of the various connections in the starting circuit were checked by operating the starter and then feeling the various connections to see if any heat was evident and it was found that all connections were cool. Checking the current taken from the battery by the starting motor it was found to be 260 amperes at first, which within five seconds fell to 240 amperes where it stayed, approximately constant.

Cell voltage at this time 1.4 volts to each cell under this load. The operation of the starter was also checked by using an entirely separate battery connected directly to the starter, the operation being similar and the current consumed being 300 amperes. While these tests were made the engine was warm and could be turned easily by hand, this condition also being checked by using a different starting motor which cranked the engine all right.

The starting motor was taken apart and the armature and field checked for grounds and found to be all right. The clearance between the armature and field pole was then checked and found to be .006 in. at one field pole, .010 at another field pole, .020 in. at the third field pole and .015 in. at the last field pole. We also found that the front end bracket was not snug in the frame, having a play of about 3/64 in. It is our opinion that the starting motor needs a new frame.—Ray Babcock, Merced, Calif.

2—In replacing worn bushings it is more likely that the armature shaft will be slightly out of center with respect to the pole piece circle than that it will be exactly in center and if somewhat out of center the magnetic pull of the field previously described will still produce great bearing friction and reduce the power of the motor.

It is also likely that if the end bracket is not a snug fit in the frame of the machine when the attaching screws are

drawn up that the bracket itself will not be absolutely right.

We have often used this condition of magnetic pull in testing plain bearing generators to see if there was any tendency for the armature to drag on the pole pieces and also to check the centering of the armature. One generator that we have checked in this manner is the Westinghouse frame No. 400 and 450 plain bearing machine, where it is a simple matter after repairs have been made to run current through the field only, having no current through the armature.

This field current can be made and broken while the armature is turned by hand and considerably difference will be noted in different machines, in some of them their being very little difference in the turning effort required with the field on or off, while in other machines exciting the field makes it very difficult to turn the armature although there is no apparent striking of the armature against the pole piece.

In other generators it is possible to detect a rubbing armature which might otherwise not be noticed for the magnetic effect of the field will make the armature rub against the pole piece if there is any tendency for it to do so. In checking starting motors for this condition the problem is not quite so easy because of the heavy current required, but if you should have carbon plate rheostat, such as is used on a high rate discharge testing outfit in battery stations, it would be quite possible to connect up the starting motor in such a way that all brushes would be lifted from the commutator and current run through the field winding only and through an ammeter and the rheostat above mentioned.

It would then be a simple matter to turn the armature by hand and then to try to turn it while a current of 150 or 200 amperes was allowed to flow through the field windings. You would probably find the condition you suspect, that with the field excited it would be very difficult to turn the armature and if this is the case, it would, of course, account for the trouble you have experienced.

CHARACTERISTICS OF ANZANI ENGINE

Q—We have a new engine bought from the government, Anzani is the name of it, and we would like to find out how the oiling system works. Send a chart of the oiling system, if possible, and all information regarding it.

1—The following matter is available on the lubrication of the three, six and 10 cylinder Anzani engine. A single cylinder plunger type pump is operated by cam action from a shaft which is driven by intermediate gearing from the main crankshaft. This plunger pump draws oil from the oil tank in the fuselage on the suction stroke and forces the oil out on the pressure stroke; return being prevented by a ball check valve on the top of the pump.

Oil lines carry the oil under pressure to two ducts in the crankshaft; one locat-

ed in front of the forward main crankshaft bearing, and the other duct back of the rear main crankshaft bearing and in front of the cam holes.

As the crankshaft is hollow bored the oil lubricates the crank pin bearings, cams and rollers. The piston pins and cylinder walls are lubricated by a spray of oil when the engine is in operation. To facilitate operation of this oil spray baffle plates or diaphragms are placed so as to restrict the area of the crankcase interior. A breather pipe relieves crankcase pressure and is provided with an automatic valve and wire gage screen.

The used oil is drained by removing a plug located in the bottom of the crankcase. To prevent freezing of the oil, a small pipe from the exhaust is led through the oil tank and maintains a temperature sufficient to prevent the oil becoming too thick for successful operation.

A lubrication regulator is used to eliminate the disadvantages of fragility, and the necessity of dismantling the glass receiver to purify the air in the lubrication tubing in the old system of the oil level. The device consists of a support to which oil flows through a three way cock.

To the support is attached a nut, which supports the body of the regulator having two slits opposite each other, through which the oil may be observed inside of a glass tube. A knurled pin controls a small valve for the escape of air. While running normally, this pin should be unscrewed at the bottom, so as to place the valve upon its seat; the regulator then acts as a pressure gage for the compressed air. Screwing in the knurled pin opens the valve and the outlet is given to the air as the lubrication pipes fill up.

While running the engine the valve of the oil gage should always be partly full. When the engine has been disassembled, introduce tepid kerosene in all the oil lines to remove any deposits which may have formed and would prevent a free circulation of oil. After cleaning with kerosene, fill these tubes with oil. This will facilitate starting the oil circulation when getting under way.

2—Where can we get a hot-spot manifold for a 1912 Cadillac?—Rice Lake Battery Co., Rice Lake, Wis.

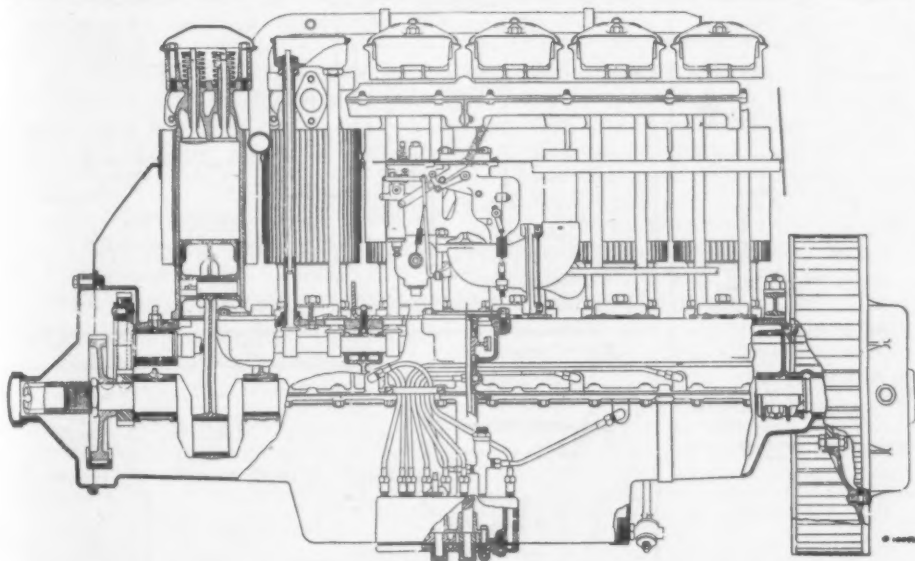
2—This will be answered by letter.

Two Effective Methods of Locking Set Screws

Set screws cannot always be trusted to remain tight.

When it is possible to use one of sufficient length, the application of a lock washer and a jam nut is recommended. When the screw is so short that there is not sufficient room for the lock washer and nut, tapping it on the head with light blows as it is turned down will cause it to make a very deep print in the shaft or other part upon which it may be seating. This has the effect of creating a large bearing surface at the point, which is not the case when the screw is simply pulled down with a wrench.

Operation of Oil Pump on Franklin



Q—Publish diagram of oil pump on a 1918 Franklin car.—Yellowstone Garage, Amherst, Wis.

A section of the engine showing the oil pump is illustrated above. It does not give very much detail of the internals of the oil pump so we shall give a summary description of the oiling system. The gear driven pump is housed in the oil reservoir and is connected to eight copper delivery pipes. The pump draws the oil from reservoir through a fine straining screen and by means of a distributor that is a part of the pump forces the oil in predetermined quantities to each main bearing. The oil passes from the main bearings through drilled holes in the crankshaft to the connecting rod bearings, from which it is thrown off by centrifugal force in a fine spray oiling the cylinders and other moving parts. The starter chain and sprockets are oiled by a lead from the front main bearing.

The timing gears are oiled by excess oil from the front main bearings. The oil after lubricating all bearings drains back to the reservoir and is then pumped over again through the same course. There are two adjustments to the oil pump, each a bypass valve. One is a needle valve located in the center of the pump which regulates the amount of oil pumped into the bearings. The other is an automatic safety valve screwed into the pump at the second pipe opening from the rear and set so that the pressure cannot exceed 50 pounds. A test to give the oil pump to see whether it is discharging the correct amount of oil is as follows:

Run the engine at such speed that the battery indicator just shows charge. Disconnect number four and number five pump leads and collect the discharge from them in a receptacle graduated so that $\frac{1}{2}$ pint can be measured. At this speed the oil feeds from the two leads together should amount to $\frac{1}{2}$ pint at

the end of 200 spurts from one of the leads. A test should not be started until the engine is well warmed up.

The needle valve stem has a right hand thread. Screwing the valve stem in increases the amount of oil pumped.

An approximate adjustment is one-fourth of a turn open.

To adjust automatic safety valve loosen the lock nut and screw adjusting screw down to increase pressure in system. Wear between the gears and housing can be compensated for by reducing the thickness of the bronze housing with fine emery cloth. Lay both on the smooth flat surface and be careful not to tip the housing while rubbing with the cloth. The pump should be fairly snug but not too tight. It should be in such a position that it can be turned freely with a screwdriver.

FIGURING PROPER DIAMETER OF DRIVE PULLEY

Q—I am figuring on using an engine for driving an ensilage cutter. This cutter is supposed to be driven from 600 to 800 r. p. m. and has a 12 in. pulley. What sized pulley would be necessary on the engine?

1—With the Hudson engine operating at 1,000 r. p. m. an 8 in. pulley would be required to drive the ensilage cutter from 600 to 800 r. p. m.

2—Would you advise the use of a transmission or drive direct from engine? This engine is a Hudson, 4 by $4\frac{1}{2}$ in. bore and stroke, speed of 1200 r. p. m.

2—It may not be necessary to use a transmission although it would make a much better installation and would relieve the engine of a lot of torsional and radial strain. We would advise that you use the transmission, with the addition of bearings on the transmission shaft between which you can mount the 8 in. pulley. With this arrangement in direct drive you will have the proper speed for driving the ensilage cutter and by using

the second or low speed you can get speed reduction which will enable you to drive other pieces of machinery.

3—Where can I secure governor for this engine?

3—The names of some firms supplying governors will be supplied you by letter.

4—How are automobile engines rated in comparison with stationary engines?—Varily Printash, Cornucopia, Wis.

4—The S. A. E. formula which is the bore multiplied by itself times the number of cylinders divided by $2\frac{1}{2}$. This gives the S. A. E. rated h. p. and is based on a piston speed of 1,000 ft. per minute. Generally speaking stationary engines are more conservatively rated and a 7 h. p. stationary engine would probably do the work of a 20 h. p. rated internal combustion automobile engine. The rated h. p. is of practically no value whatsoever in making an installation for driving machinery as the actual brake h. p. and power characteristics such as maximum torque and h. p. curves being necessary.

MACHINE WORK NECESSARY IF PLATE CLUTCH IS TO BE INSTALLED

Q—We have a model 6-H Continental engine which is equipped with a cone clutch. This engine has no bell housing and it is equipped with an amidship transmission. The flywheel was 15 $\frac{1}{2}$ in. outside diameter.—C. J. Hall, Rosalia, Wash.

It is possible to install a No. DX-10 Borg and Beck clutch in this flywheel if the flywheel has the necessary depth. You have not given us this dimension but we would state that it must have a minimum depth of 2 $\frac{15}{16}$ in. The installation of the clutch will involve several other changes such as a change in the throwout mechanism and for this reason we would advise that you communicate with the Borg & Beck representative at Seattle. The name of this firm is the Colyear Motor Sales Company, 919 Pine St., East Seattle, Wash.

CAM WEAR COMPENSATED BY OVERSIZE CAM FOLLOWERS

Q—The cam followers on a local four cylinder Overland have considerable lateral movement. Also notice these followers are not bushed. What is the usual practice for remedying same? Should we turn down and insert steel bushings or do the Overland people furnish an oversize?—Red Diamond Service Station, Manitowoc, Wis.

We presume that you refer either to the model 90 or to the Overland model 4. In the model 90 the wear was compensated for by replacing the cam follower bracket which was of cast iron and would wear a great deal faster than the push rods. Replacement of this bracket would entirely eliminate the lateral clearance in this model. On the model 4 where the valve cam followers operate in the crankcase, the natural wear is compensated for by the installation of oversize cam followers which can be secured from any official Overland Service Station. They are made in various degrees of oversize.

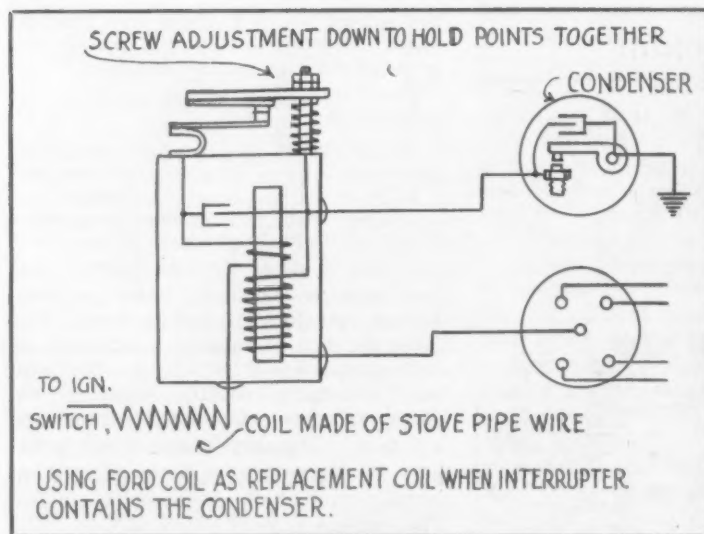


Fig. 1

FORD COIL UNIT INSTALLATION ON BUICK

Q—Give instructions for wiring a Ford coil unit for emergency use on a Buick or other cars using battery ignition.

1—If the ignition system on the car in question uses a coil which also contains a condenser then it is necessary to insulate the vibrating contacts of the Ford coil with a piece of heavy paper or card board or thin piece of wood. Connections can then be made as shown in Fig. 2. In this sketch the upper terminal at the side of the coil is connected to ground, that is, the frame of the car or engine. In making these connections, it will, of course, be necessary to solder wires or terminals to the Ford coil terminals.

The lower terminal on the side of the Ford coil unit will connect to the center of the distributor. Ordinarily the bottom terminal of the Ford coil unit is connected to the ignition switch but as the Ford coil draws about 10 amperes and most ignition systems draw 5 amperes there will be an abnormal burning of the interrupter contacts. If a coil of iron wire is made up from stove pipe wire, however, and connected as shown in the sketch, it will be possible to cut the current to 5 amperes and have satisfactory operation which would make the Ford coil all right for permanent use if it seems desirable. The amount of iron will have to be determined by experiment and as previously stated should be such as to allow the entire coil to draw about 5 amperes when the interrupter points are closed.

In case the car should have an eight cylinder engine it would be permissible to allow 6 or 7 amperes to flow which would mean the use of a shorter piece of iron wire in the ballast or resistance coil. Some ignition systems have the condenser mounted in the interrupter and in this case instead of insulating the vibrating contacts on top of the Ford coil the adjustment should be screwed down as shown in Fig. 1 so as to hold them tightly together. The ground in

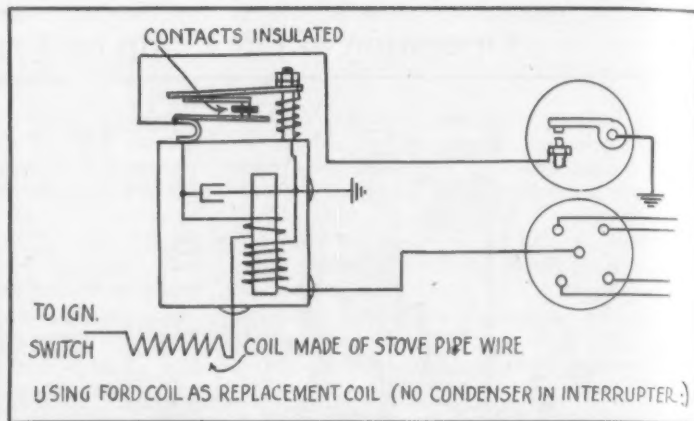


Fig. 2

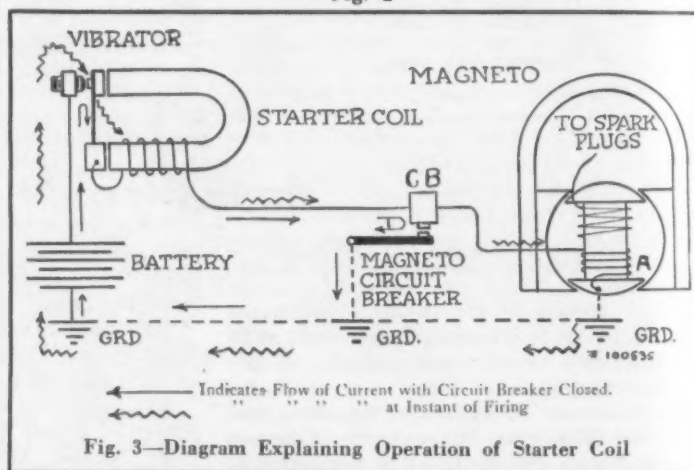


Fig. 3—Diagram Explaining Operation of Starter Coil

this case is unnecessary, the upper terminal at the side of the coil being connected to the interrupter.

2—Explain operation of the Fansteel vibrator switch.—A Subscriber, Lassen, Calif.

2—The Fansteel vibrator or starter coil is a device based on the same principles as the Master vibrator which was at one time extensively used in connection with Ford cars. In that case the idea was to get more uniform timing of the spark in the different cylinders. This action is exactly the same as a door bell, being an electric vibrator but usually has a condenser connected across its contacts in order to give more sudden stopping of the primary current and consequently, better ignition. In Fig. 3 is shown the circuits of a Fansteel starter coil used in conjunction with a high tension magneto.

When the interrupter points in the magneto happen to be closed the starter coil will vibrate with a very loud sound the current from battery going to the starter coil and interrupter points only. When the interrupter contacts separate, however, which is the correct time for the magneto to fire, the battery current through the vibrator will go through the primary of the magneto, the sudden changes in primary current generating the secondary spark at the spark plug. While the condenser does not show up in this diagram of the Fansteel starter coil it is no doubt, included in the actual device.

FANSTEEL STARTER COIL INSTALLATION

Q—Give diagram showing how Fansteel starter coil works also how to connect it up for Bosch, Eisemann and Splittorf H. T. magnetos, also for Remy, Briggs, and Splittorf low tension magnetos.

1—The general principle of operation of the Fansteel starter coil is shown in Fig. 5 where it is shown applied to a high tension magneto. The action is similar to that of an electric door bell except that a condenser is usually connected across the contacts.

At the instant the interrupter points in the magneto open a series of current impulses flow through the primary of the magneto generating the spark at the secondary. When the interrupter points of the magneto are closed current still flows from the battery through the vibrator but does not affect the magneto. In Fig. 5 the starter coil is shown applied to high tension magnetos and in Fig. 4 is shown applied to low tension magnetos.

2—Advise where hotspot manifold can be obtained for use on model 75B Overland car.

2—This information will be given by letter.

3—How can a stuck armature in an electric horn be started?

3—If the armature of an electric horn will not turn although the horn is drawing current it is possible that the adjustment is screwed up too tight and it might be well to try backing off the adjustment. It may also be the the bear-

ings are stuck due to lack of lubrication and it may be necessary to take the horn apart and oil it carefully and then reset the adjustment. It is also possible that the fields or armatures are either shorted or grounded which would cause a heavy current to be taken from the battery without producing the necessary torque.

4—How can hard grease be removed from transmission?—D. H. Williams, Menan, Ida.

4—To remove hard grease from a transmission would suggest washing it out with gasoline also scraping with a putty knife.

WATER JACKET CONNECTION ON STUDEBAKER RAYFIELD

Q—We have a Studebaker 1918 model Big Six and want to install a model G or L Rayfield carburetor. Advise how to make water connections. We know where the lower one goes to but do not know exactly where the upper should be connected. Do we have to tap a hole for the upper connection or not?

1—The upper water connection on the Rayfield model G or L carburetor should be connected to the most convenient place in the water circulation system on the discharge side of the pump. Preferably this should be some place in the water jacket or at a point on a level with the water jacket.

In examining the layout of the Studebaker Big Six engine a method suggests itself which is as follows: Tap a hole into the pump elbow at the front end of cylinder casting. This can be easily done by removing the hose on the discharge side of the pump and by taking off the nuts from the studs that hold this elbow to the cylinder casting.

The hole should be tapped at its lowest point if possible and the pipe should be led to the carburetor with the minimum number of bends. This is probably the easiest method of installing the water piping.

If ease of installation is not to be considered and you wish a very permanent job we would advise that you tap the cylinder casting water jacket at any convenient point, for instance, just below the intake manifold ports on any of the cylinders.

However, this method entails the chance that one may not strike the most suitable spot in the water jacket and we believe that you would profit by installing this fitting onto the water pump discharge pipe upper elbow which bolts to the cylinder block at the front end. A T should be placed on the lower water connection fitting of carburetor so that a pet cock can be inserted there to drain any water that may fail to drain when the pump is empty.

This T should have one male end and one coupling end which will take the flared tubing coming from the water elbow cylinder casting and the other end should be either a male or female thread to accommodate either a male or female pet cock.

2—Give names of firms selling overhead valve heads for Fords.

What would be the maximum speed of a Ford equipped with a valve head, high speed camshaft, light pistons and rods and equipped with magneto?—Brun Rachki, Roslyn, Wash.

2—This will be answered by letter.

VARIETY OF INFORMATION

Q—Tell me the sizes of Duesenberg inlet and exhaust valves.

1—The size of the Duesenberg valves are $2\frac{1}{2}$ in. clear diameter, and they have a lift of 31-64 in.

2—Do two camshafts have an advantage over one in a racing engine?

2—This is a question that it is impossible to answer definitely. If we should give an answer from the theoretical point we would state that one camshaft would be better because there would be less inertia to be overcome. However, with this practice no definite rule may be followed as there are many factors which must be considered. Whether the engine is a V engine or a vertical engine has a great deal of bearing on the question also.

3—I have a Ford racer which I would like to practice with on Uniontown Speedway. Do I have to have permission to do this?

3—We would suggest that you communicate with A. E. Corn, Uniontown, Pa., who is manager of the Uniontown Speedway.

4—Do you think the Frontenac Motor Company would undertake to build me

a 122 in. displacement racing engine?—Wilbur Osborne, Vestaburg, Pa.

4—We believe that this firm would be pleased to undertake the construction of such an engine. However, the letter should be addressed to the Chevrolet Bros., Mfg. Co., Indianapolis, Ind., instead of to the Frontenac Motor Co.

FERRO ENGINE IN SCRIPPS BOOTH

Q—What is the bore and stroke of a Scripps-Booth small Eight, 1917 model?

1—2 $\frac{1}{2}$ by 3 $\frac{1}{8}$.

2—What oiling and ignition systems are used?

2—The lubrication was by pressure with a gear pump. The starter was built by the Wagner company and this car carried Remy battery ignition.

3—Give maximum h. p. and at what r. p. m. is it developed?

3—The maximum h. p. of 35 was obtained at 3000 r. p. m.

4—Give gear ratio of rear axle.

4—The gear ratio was either 4.80 to 1 or 4.21 to 1. Both ratios were used during the same year.

5—Publish power curve.

5—This is not available.

6—Was this model discontinued? State reason if any why it would not have proved satisfactory for dirt track work?

6—The purchase of the Scripps-Booth Motor Car Co. by the General Motors may have been a factor in the discontinuance of the eight cylinder model. We know of no serious objections to converting this car into a dirt track racer. However, it is not overpowered by any means and you should cut down the weight as much as possible and try to secure a good chassis balance.

7—What make axles and transmission are used?

7—The model D used its own front axle and the rear axle was built by the Russell Axle Co. The transmission was built by the Warner Gear Co., Muncie, Ind.

8—What make steering gear?

8—The maker of the steering post is not definitely known although the four cylinder model G used a Jacox steering gear.

9—What is weight of car approximately as standard equipped with four passenger roadster body?—Alfred K. Young, Johnstown, Pa.

9—2250 pounds.

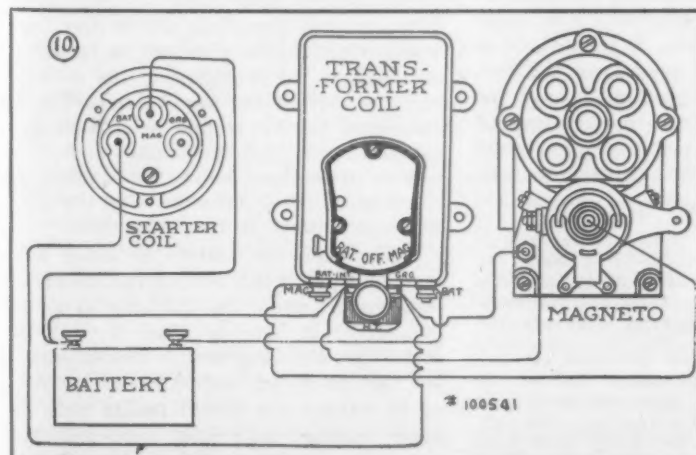


Fig. 4—Fansteel starter coil used with low tension magneto.

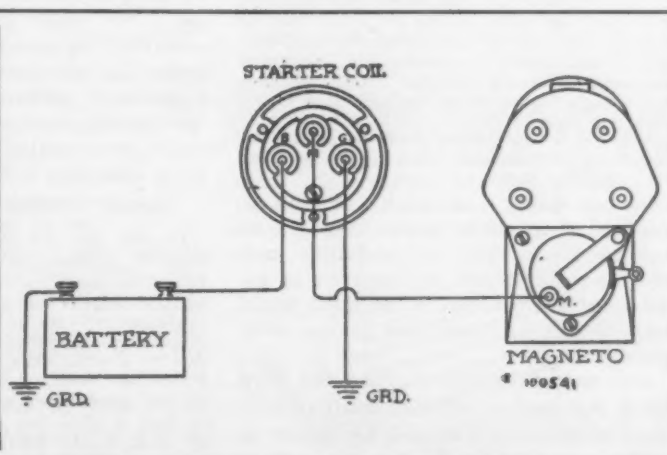


Fig. 5—Fansteel starter coil used with high tension magneto

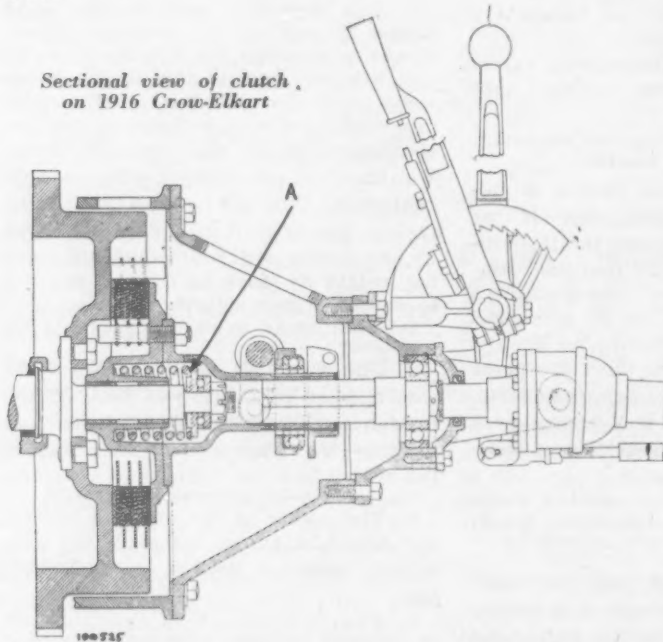
CLUTCH ADJUSTMENT ON 1916 CROW-ELKHART

Q—A dry plate multiple disk clutch on a 1916 Crow-Elkhart is very grabby. The clutch has been relined with the recommended lining and we have oiled same with Neatsfoot oil, nevertheless, it continues to grab. What can be wrong with it? Range Service Garage, Wakefield, Mich.

A sectional view of the clutch is shown below. This trouble may be due to too much tension on the clutch spring which is shown at A. The tension at this point can be adjusted by turning the nut directly behind the thrust bearing on the clutch spring. The clutch housing should have just enough oil to allow the disks to dip into it. This oil should be preferably cream separator oil.

It will not be sufficient to squirt oil on the disks of this clutch but enough oil should be put into the clutch housing so that the disks will actually dip into it, not more than $1\frac{1}{2}$ ins. of the lower surface being immersed in the oil. The clutch spring should be adjusted so that it is just tight enough to prevent slipping.

Sectional view of clutch,
on 1916 Crow-Elkart



YELLOW BRUSHES SHOULD BE INSTALLED IN MAIN BRUSH HOLDER

Q—We have a Northeast generator on a Dodge car with which we have had no success so far as adjusting current output is concerned, as it charges too much at even medium speeds. New brushes have been installed including third brush and the charge rate is still 12 to 15 amperes. Give us information in regard to reducing the output.—Horton Motor Car Co., Macon, Wisc.

1—We would call your attention to the Dodge article in the Dec. 1, 1921 issue of MOTOR AGE. In installing new brushes care should be observed to get the yellowish brushes in the main brush holders and the black one in the third brush holder.

You do not mention shifting the third brush but assume you are familiar with this, as there is one locking screw at the commutator end bracket which

should be loosened slightly and then the adjusting screw at the top of the bracket can be turned so as to move the third brush against the direction of armature rotation, as this is always done to cut down the current output.

If third brush adjustment does not cut down the current we have two suggestions to make, both of which require removal and disassembly of the generator. With the generator taken apart we would suggest that you remove the fuse from the holder and see that all of the brushes are insulated from each other and from the commutator, also disconnect the series field from ground and then test for short circuit between the shunt windings and ground also between the series winding and ground and between the shunt and series windings, using 110-volt circuit with a lamp in series.

Occasionally Dodge generators have given trouble on account of insufficient charge to the battery and on these the third brush arm has sometimes been removed and a shorter one installed

which has the effect of moving the brush in the direction of rotation and increasing the output. It was sometimes found, however, that with the installation of the short brush holder that the output was then too great instead of too little and to compensate for this it has quite often been necessary to file an extra tooth in the segment with which the third brush adjustment pinion meshes.

If in doubt as to which end of the segment to file the extra tooth, it would do no harm to file

an extra tooth at each end of the segment so as to obtain the greater range of third brush adjustment. If you observe the above instructions and make sure that the generator is properly connected as shown on page 23 of the Dec. 1 issue, I believe you will have no trouble in getting the desired output which is normally $7\frac{1}{2}$ amperes maximum when charging a fully charged battery.

LOOSE WIRES ON GENERATOR

Q—We have had considerable trouble with a number of Auto-Lites model G. B. generators on Overland 75 car due to the wires coming loose in the commutator which, of course, prevents the generator charging. This is apparently due to overheating but as there appears to be no way of regulating the output of the generator, we have not been able to find a cure for this trouble, although in many cases when the wires have been resoldered into the commutator the gen-

erator would give good service. While some of the resoldered generators give good service others work for a short time and then throw the solder and the wires out of the commutator bars again. In checking the charging rate we found it to be 18 amperes at high speeds.—C. F. Boatner, Byers, Texas.

1—The charging rate of 18 amperes is too much for this type generator as it should not exceed from 12 to 14 amperes. The regulation is not adjustable but is taken care of by means of reverse series or bucking winding on the two field poles. One of the brushes connects through one series coil to ground while the other brush connects through the other series coil to the live terminal which goes to the cutout or relay. There are two possible causes of excessive charge current for this type of generator, one being that the series windings are shorted out and other being that the series windings are reversed.

To test for this it would be practically necessary to have the generator on a test bench. Then with the generator running at a certain speed the charging rate to the battery should be observed, the connections should then be changed from live terminal and ground and put directly on the two brushes.

This should have the affect of giving a higher charge to the battery because the bucking effect of the series winding has been eliminated. If, however, the charging rate remains the same it would show that the series windings were shorted. If on the other hand the charge to the battery was reduced by connecting directly to the brushes it would show that the series windings were reversed. If no trouble is evident in the series winding it is possible that the use that the car has keeps the battery in a fully charged condition which would maintain approximately eight volts at the generator instead of about six and this high voltage always maintained at the generator will keep the generator putting out its maximum current due to the high voltage that the shunt field gets.

The correct brush tension is from one pound to one and one-quarter pound. If you have any certain customers that drive three or four hours a day and consequently, keep their battery in a fully charged condition all of the time would suggest that a switch be installed on the dash for shorting out the generator. One terminal of the switch should be connected to the engine and the other to generator live terminal and this switch if closed while the engine is standing still will put a short on the generator and keep it from charging.

Then when the battery is about half way discharged this switch can be opened again to allow the machine to again generate. If this is done it may be found that the generator is demagnetized but this condition can be easily corrected by closing the cutout points once by hand making sure that the shorting switch is opened.

Instructions for Adjusting Rayfield and Marvel Carbureters

Q—State proper way to regulate the Marvel carbureter on Nash Six 1919.

1—The adjustment of the Marvel carbureter on the 1919 Nash Six series 681 is as follows: Close gasoline needle valve which is at the bottom of carbureter until it is seated and then open by turning to left about one turn. Final adjustment is usually one and one-quarter turn open. The air valve adjusting screw should be so adjusted that the end of the screw is about even with the end of the ratchet pointer that presses against it. These are the preliminary adjustments of the carbureter which will enable you to start the engine regardless of the adjustment of the carbureter previous.

After the engine has started close throttle to moderate speed which means nearly closed. At this point close gasoline needle valve a very little at a time until engine runs smoothly, with spark fully retarded before making final adjustments. The next step is to get proper adjustment of air valve. To accomplish this, the air valve adjustment screw should be turned to the left, to back out and release the air valve spring about $\frac{1}{8}$ of a turn at a time, until engine begins to slow down. This indicates that the air valve spring is now too loose, whereupon it should again be tightened a little by turning to the right, $\frac{1}{8}$ of a turn at a time, until the engine runs smoothly.

Next, fully advance spark and open throttle quickly and as far as possible. Upon doing this, engine should speed up promptly and quickly; if it hesitates, or "popping back" is heard, a little more gas should be released at the gasoline needle valve by turning to left a very little at a time. Wait for engine to settle and again open throttle quickly as before. Repeat these trials until the proper adjustment is obtained, the object being to have just enough gas, and no more, to allow engine to pick up promptly and smoothly when throttle is suddenly opened, the spark as mentioned being fully advanced.

If at first no "popping back" is heard, when throttle is quickly opened, there is a possibility of too much gas being turned on, and same should be corrected by turning the needle valve to right, or in, until throttle can be opened quickly and engine hesitates or "pops back" before picking up speed, with spark retarded, but picks up quickly and smoothly without "popping" by simply advancing spark and again opening throttle, which indicates that the proper adjustment has been obtained. The float level should be so that the float should stand in such position that from the top of float to top of bowl at back side, next to mixing chamber, the space measures nine-sixteenths inches.

The highest economy of fuel will be obtained by adjusting the air valve ad-

justing screw to left and the gasoline valve to the right as far as possible and still obtain the desired results. The warm air control located on dash should be kept at "Cold" or button pushed all way in position in hot weather and at "Hot" or button pulled way out in cold weather. If low grade fuel is being used it is advisable to use all the heat possible for the carbureter. Any degree of heat desired may be obtained by intermediate positions of the season adjustment which is on the small pipe leading to the carbureter and connected to the throttle lever. This is a small shut-off damper that is in the exhaust inlet to the jackets of carbureter and when this is parallel to the little cross arm on damper shaft the valve is wide open. Care must be taken to loosen the set screw on damper shaft and again set it when making heat adjustments with this season control. It will be necessary from time to time to clean the carbon from hot air chamber, and from the tube connecting it to the exhaust pipe.

Installing Alemite System

2—What would have to be done to install the Alemite system on a National Sextet 1920?

2—The only thing that will be necessary on the model 1920 National Sextet to install the Alemite system would be to remove the old style grease cups and secure the special fittings required. This car requires 31 fittings.

Grinding Noise in Transmission.

3—A 1918 Dodge has a grinding noise in the transmission at all speeds and gears. Give remedy and proper instruction for removing transmission and clutch.

3—This trouble is caused either from end play in the crankshaft or in the transmission shaft, or is caused from worn transmission shaft bearings. At any rate it will require the complete dismantling of the clutch and transmission units. Directions covering this operation were published in the January 12, 1922 issue of MOTOR AGE, under the heading of "Repairing Dodge Clutch."

Adjustment on Rayfield Carbureter

4—How is adjustment made on Rayfield carbureter on National Sextet 1920?—J. W. Van Duyn, Rockford, Ill.

4—This carbureter is equipped with two adjustments, the low and high speed which are both secured by means of adjusting the knurled screws. The low speed adjustment is the lower of these two knurled screws and works on the cam connected to the choker. To secure the low speed adjustment first be sure that the engine is hot. Close the throttle, advance the spark and push the choke button all the way in. Turn the low speed adjusting nut to the right for a richer mixture. If engine will not throttle low enough there is a set screw just in back of the high speed adjustment which should be adjusted. This

set screw limits the closing of the valve in the gas passage. Do not unscrew it too far or the engine will stop every time that the throttle is closed. The low speed adjustment should be turned to the left or as lean as possible until the engine starts to slow down, after the engine runs smoothly.

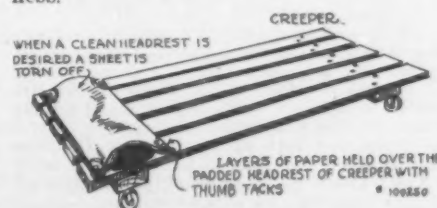
This completes the low speed adjustment. The high speed adjustment is not affected by the low speed adjustment and low speed adjustments do not affect high speed and should not be used to correct high speed mixture. Turning the high speed adjusting nut to the right enriches the mixture. Thus with the spark fully advanced and throttle suddenly opened the engine should pick up quickly without any hesitancy or without "popping back." Should the engine show signs of "popping back" this is due to too lean a mixture and must be corrected by turning the adjustment to the right to give more gas. If the engine hesitates it is an indication that the mixture is too rich and should be turned in the opposite direction.

REMOVING A STUCK CORE FROM A TIRE VALVE

When the valve core fails to come out of an inner tube valve in the usual way it is frequently somewhat of a task to remove it. The following simple method was worked out by an eastern tire repairman. The tube undergoing repair was punctured at some distance from the valve, and the hole made a point for the insertion of a piece of stiff wire which was introduced into the valve stem from the bottom and used to push the stubborn core out. In this case the puncture was already there, however, in a good tube it is easier to repair the slight puncture needed to introduce the wire than it is to remove the valve stem from the tube. The hole should be made at a distance of several inches from the valve, so that in the later mending process the latter part will not be in the way.

PAPER MAKES CLEAN HEADREST FOR CREEPER

A simple means of keeping clean the headrest of a creeper used in the repair of the underside of cars and trucks is herewith illustrated. This is made by tacking down over the cushion many layers of ordinary wrapping paper. As the upper layer becomes soiled it is torn off, leaving a clean and sanitary headrest. This simple precaution is desirable for the protection of the hair and skin. It also promotes general cleanliness.

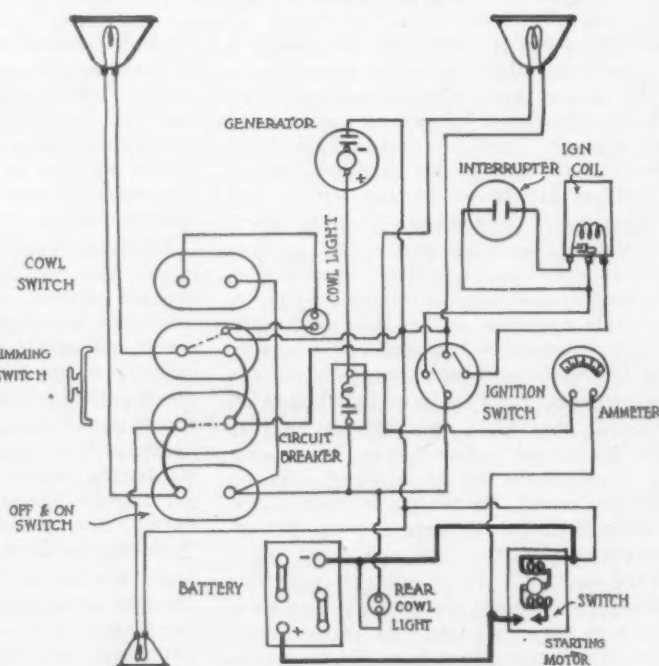


Mystery Tale—Peculiar Action of Tail Light

We recently had a case of trouble on a 1919 Haynes of the following nature: The tail lamp would light up when the ignition switch was turned on and would remain lighted burning dimly all the time the engine was running. With the ignition switch turned off and the engine not running, however, all of the lights were normal and operated in accordance with the positions of the lighting switch buttons. In looking for the cause of the trouble the lighting switch was taken apart, but was apparently all right. Grounds, however, were found, one being on one of the main brushes of the generator, the other being in one of the interrupter contacts. When these grounds were removed the trouble with the tail lamp was also overcome. How could these two grounds cause the trouble above described?—J. W. Beard, Stock Yards Garage, St. Joseph, Mo.

For the benefit of those who are interested in working on problems of this nature we have shown above a diagram of the Haynes car in question.

In this diagram we have simplified the generator somewhat, showing merely that it has an armature and a pair of contacts which are shown opened, these being the cutout points which are not closed except when the generator is running. The lighting switch is shown at the left and consists of four gangs, the



MYSTERY TALE 1919 HAYNES

center two however, being operated together by a common button indicated at the left. The upper gang in the diagram operates the cowl switch, the lower gang turns the head and tail lights on and off while the position of the center button controls the dimming of the headlight. On the center two gangs will be seen the two dotted lines, these representing the connections made when the center button is in the bright position, while in the dim position these dotted connections are not made but the solid line connection on the second gang from the top is made.

Responsibility for Accident in Garage

Q—Will you kindly give us some legal advice regarding an accident which happened in our garage some time ago, in which the man who was hurt with his own Ford car, which was then seven years old, is now suing us for damages?

The man in question was a stranger to us at the time, and drove his car into our garage and said that his low speed band needed tightening, as it was so loose that when he pushed his clutch pedal down into low, it would not come back readily into high, and asked us to tighten it up so that it would come back out of low when he took his foot off the pedal.

We tightened up the band and the owner opened the gas accelerator wide, went around in front and cranked it. The car ran ahead and bumped him, hurting him considerably. We then examined the car and found that the high speed clutch dragged to such an extent that it was impossible to crank the car up, when it was standing on a cement floor, without it running ahead.

This man did not pay or offer to pay for services rendered, but a year afterwards, as we understand, was persuaded to sue us for \$56,000 for injuries for life which he claims to have sustained at the time of the accident.

Could you tell us if the law requires that a Ford car should be equipped with a hand brake in good working condition? Would also like to ask if this man could

collect damages for getting injured in our garage when he did not pay for the work done on his car? We have proof that he knew that there were no brakes on his car to hold it and that he had to block it when he cranked it at home to keep it from running ahead. How could he hold us responsible for injuries sustained under the conditions that we have mentioned? We think he is going to charge that the tightening of the low speed band, which we did, was the cause of the car running ahead on him.—Downing Garage, Downing, Wisconsin.

A—The damages asked are for negligence on your part. To get an answer you must get down and discover as a fact, whether you were negligent in what you did or failed to do, and whether this negligence caused or proximately caused the injury complained of. Now this plaintiff must show that you were thus negligent by a preponderance of the evidence as brought out on the witness stand and he must further show that he himself was not negligent thus contributing to the accident and the resulting injury. Contributory negligence is a complete defense to a suit for negligence.

These principles will help any person to determine as to his negligence and the probable outcome of his case.

That the claimant was a stranger has no bearing here and we can eliminate that. Gratuitous services do not require the same degree of care as where payment is made or intended. Your being in the business it would appear that claimant intended to pay for the services rendered, and the accident was used as an excuse for not paying. It is probable he will show such and this will not enter in.

Now when he told you just what to do and you performed, or attempted to do so, your negligence rests on whether you acted and performed your task with the same degree of care of a reasonably prudent man, skilled as you held yourself out to be, under the same circumstances. This is always a question of fact to be determined by a jury and what they find is the fact will seldom be set aside by a trial court or reversed on appeal to a higher court. So you can see the necessity of getting your favorable evidence before the court.

Large concerns with many negligences cases coming against them are prepared to gather the evidence on the spot to keep and preserve for a future possible trial. Notably street railway companies. And they instruct their employees how to go about getting the evidence. While the layman injured does not understand what he should do and often comes into court with a meritorious case but no evidence to prove it.

If you tightened the band just as directed then on at that point alone you should be given a verdict.

Again it might be that the claimant's opening up, "wide open," was the real cause of the accident, or it at least contributed to the cause of the injury. If so, you should have a verdict on trial.

Again it would appear that claimant was negligent in having no rear wheel brakes, which would contribute to the accident, and therefore, you should have a verdict at the hands of a jury.

Again if the dragging of the high speed clutch caused the car to run ahead, as you suggest, and you had no knowledge of this defect and were not instructed to repair, then you should not be held guilty as that at least would be the contributing cause if not the whole cause.

The only statute in Wisconsin on brakes provides that no automobile shall be operated upon the highways without good and sufficient brakes. Nothing is said about hand brakes. If they are not necessary they are not required. But if they add to the safety of the public they would be required—while being operated on the highways.

Yes, an injured party might collect damages though he did not pay for work done on his car.

From all the facts you have presented, we are of the opinion you can win your case.

WHAT IS THE TRACTOR FOR?

This Is the Question That Every Dealer Should Answer Before He Makes the Sale. There Is a Size Tractor For Every Farm and For Every Job

WHAT is the tractor for?

The man who is selling tractors or who is going to sell them should get a satisfactory answer to this question before he attempts to sell another prospect. It is undeniable that a good many people have been entirely mistaken as to the object of the tractor.

Primarily, the tractor is a farm machine. The industrial uses of the tractor, of which much has been heard lately, will not constitute any factor in what follows. That is a side show.

Recently J. B. Bartholomew asked the above question and then he proceeded to answer it about as follows:

There are three clauses to the answer:

First, It will do the work quicker;

Second, It will do the work cheaper;

Third, It will do the work better.

There has been a good deal of misunderstanding regarding the tractor. Too many persons have believed that the tractor was a machine expressly made to be kept at work every day in the year and that the farmer should devote the major part of his time to working the tractor.

Getting the Work Done Quickly

But the fact is that there is certain work to be done on the farm and the farmer knows the need of getting this work done at a certain time just as quickly, as well and as cheaply as possible. If he invests in a tractor that does this work in the least possible time and does it better and more cheaply than any other method will do it, he has got what he wanted and what he paid for.

What the tractor does the rest of the year is more or less indifferent. If it does this job, it has paid for itself.

The present idea of "a size tractor for every size farm and for every kind of a job," is the proper theory. Too many tractors have been sold to suit the pocketbook, while the size of the farm and the job ahead were entirely overlooked.

There is always a main job for which the tractor is wanted and the rest of the service is more or less incidental. Belt work usually is in some accord to the size of the farm and it is rare that a tractor that would do the main job would not be sufficient for the odd jobs and added service wanted by the farmer.

Too Much Emphasis in Incidental Features

Entirely too much emphasis has been laid in the past on the belt work and hauling features. It is seldom that this is the main thought, although in some cases it might be. A farmer might buy a tractor for stump pulling and then have it for farming after that job is completed, but that is an extraordinary case. Then, too, the farm must be studied. Tractors are rated by plow capacities for average conditions.

Suppose the farmer that wants to buy your tractor does not own an average farm. He might be cultivating one of these very fine truck farms or again his acreage might be sticky gumbo. Either would be an exception. Because a tractor is called a two-plow does not mean that it will pull two plows under all conditions, neither does it indicate that it will not pull three plows under some conditions.

If you apply the theory of "a size tractor for every job," you will look well into the job before you recommend the tractor that the man with the job should buy. If it is a stationary engine that the man wants, do not sell him a tractor.

Hundreds of articles are being written by people who call themselves tractor experts, which chiefly express the ignorance

of the writer. One of these writers recently contributed to a daily paper an article that included among the things a tractor could do, the pulling of a baby carriage and the operation of a wind mill. He should have added that it could be used to carry a crazy expert to an asylum but that a highspeed automobile would be better.

Then, too, there is the expert who says that a tractor should be used 365 days in the year to cut down the overhead. Some agricultural university men say that a tractor is used in the field only 50 or 60 days and they dwell on the big investment that is idle the rest of the time.

Comparative Value

The value of a tractor can best be visioned by comparing it with other methods. The farmer has had a system of working wherein the length of the day was limited by his power plant—horses—not by human ability or the number of men on the job. Each worker devoted 20 per cent of his working time to caring for his power plant and this same power plant consumed 20 per cent of the grain and forage crops while raising it. There is much that the farmer must learn to make the most of his plant.

A pound of butter is worth more than a bushel of corn. At this rate the farmer might profitably as well as pleasantly be engaged in caring for a few dairy cows as in raising horses to eat the corn that he grows.

A crate of eggs will bring as much in the market place as a load of corn. If the farmer is so devoted to living things he might do well to study the breeding of chickens. Pork, too, is often a profitable crop. All of these living things will eat grain and forage as well as a horse.

Most farms are underpowered and undermanned. Perhaps many farmers do not understand this, but it is true. Most farmers have not enough power, either animal or mechanical, to get the most out of their plants. One reason for this is that power has been so very expensive on farms. With the tractor it need not be.

Sold on Tractor Idea

There is a lesson for the farmer in factory production methods. A quantity production manufacturer will not content himself with the size of machines for certain operations on the market, but when he visualizes the possibilities of his field, he causes to be designed and built a great machine that requires carload after carload of machinery and tons and tons of gravel for its installation. Then he may use this great machine to turn out small tools for the farmer and advise the farmer to use them for every size of production job.

The manufacturer has discarded the small machines because of the man power required, but he advises the farmer to use the small machines because they do require man power.

I believe that the American farmer today is well sold on the tractor. Much has been made of the exceptions, but the reason much has been made of them is because they are unusual and, therefore, news. It would not be news to go through the country and write up every farmer who has found his tractor profitable.

But the American farmer is not as widely informed as to tractors as he needs be. Neither is the dealer. There must be more information and this information must be disseminated by the press, by demonstrations or by shows. There is always discussion as to which method is the best. There always will be.

Personally I believe that demonstrations are of great value to the upbuilding of an industry. They are educational and when the tractor is properly understood by the consumers and the dealers, there will be no question as to its future.

The ACCESSORY SHOW CASE

New Sources of Retail Profit

AINSWORTH VISOR AND SUNSHADE

The Ainsworth Visor and Sunshade is made of ribbed plate glass in either amber or green color. Price \$12 all sizes. Ainsworth Mfg. Co., Detroit, Mich.

W & C EXTENSION FOR FORD DOOR HANDLES

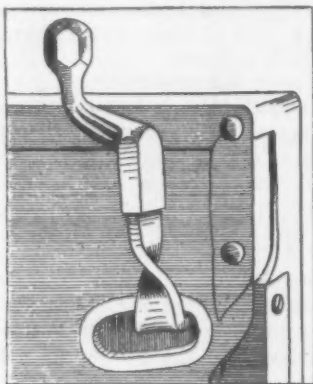
W & C extension for Ford door handles are made in two finishes, aluminum or black enameled. Aluminum, set of three, \$1.25. Enamel, set of three, \$1. P. H. Webber Co., Hoopeston, Ill.

ONLI-1 SOCKET WRENCH

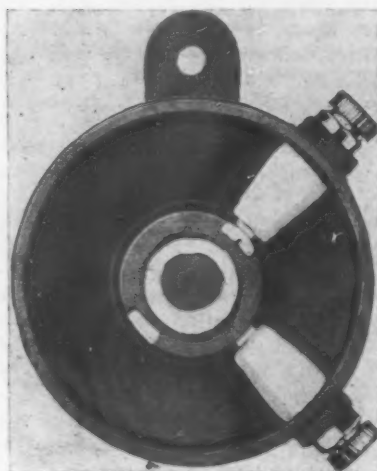
With the Onli-1 Socket Wrench is supplied an extension shaft, made from one-half inch hexagon, cold rolled steel. There are six sockets of the same material and the outfit comes complete in a black Japanned box for \$7.50. King Tool Co., Asbury Park, N. J.

BRUNO TWO-WIRE TIMER

The feature of the Bruno Two-Wire Timer is that it has but two wires in place of four, with none on the fan-



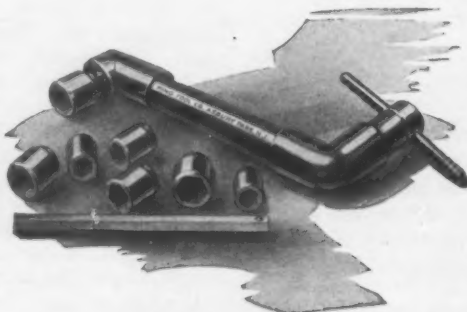
W. & C. extension for Ford door handles



Bruno two-wire timer



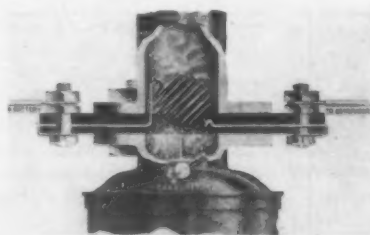
Goodell-Pratt feeler gage



Onli-1 socket wrench



Ainsworth visor and sunshade



Romey fuel electrofier

Halladay spring bolt bumper fittings showing front



(top) and rear (bottom) connections

belt side for connection. Price \$4. Bigelow Brun Mfg. Co., 537 S. Dearborn St., Chicago.

GOODELL-PRATT FEELER GAGE

Goodell-Pratt feeler gages are supplied with six leaves, .002, .004, .005, .010, and .015 in. thicknesses. The leaves are two and one-quarter ins. long by one-half in. wide. Price, 60 cents. Goodell-Pratt Co., Greenfield, Mass.

ROMEY FUEL ELECTROFIER

The Romey fuel electrofier is installed between the carburetor and the manifold and it is claimed, gives a car from 20 per cent to 35 per cent more mileage. Bukolt Mfg. Co., Stevens Point, Wis.

SPRING BOLT BUMPERS FITTING

The L. P. Halladay Co., Decatur, Ill., has added to its line a spring bolt bumper fitting. The front of the fitting arm is held by a clamp which is fastened to the frame by the spring bolt. The rear end of the arm is attached to the frame through an adjusting slot by wedge and bolt fastening, which reinforces the frame and holds the fitting securely. The fitting arm is made of the same spring steel material as the bumper bar itself.

FOLEY TRACTOR-RIM

This rim is designed to provide traction for trucks through sand, mud or other heavy going in soft fields. Made also for phaetons and Ford solid tires. Foley Tractor-Rim Co., 108 Tenth St., South, Minneapolis, Minn.



Foley tractor-rim

COMING MOTOR EVENTS

AUTOMOBILE SHOWS

Hammond, W. Va. Williamson Automobile D'l'r's' Assn. May 10-13
 Central City, Nebr. Business Men's Club.....May 24-27
 Hartford, Conn....Connecticut Fair Grounds.....Sept. 4-9
 Spokane, Wash.,...Annual ShowSept. 4-9
 ChicagoAnnual Show of the Automotive
 Equipment AssociationNov. 13-18

FOREIGN SHOWS

Rio de Janeiro....Automotive ExhibitionSept., 1922
 Paris, FranceAutomobile ShowOct., 4-15

CONVENTIONS

St. Louis.....Am. Auto. Assn. Annual Meet.....May 22-23
 Colo. Spgs., Colo..Automotive Equipment Assn.....June 19-24
 White Sul'r Spgs., W.Va..S. A. E. Summer Meeting.....June 20-24
 Olympia.....Washington Automotive Trade Assn..July 21-22

RACES

Indianapolis.....500-Mile International.....May 30
 Tacoma, Wash....Eleventh Annual RaceJuly 4
 StrasbourgFrench Grand Prix.....July 15
 Colo. Spgs., Colo..Pike's Peak Race.....Sept. 4
 San Carlos, Cal...500-Mile Armistice Day Race.....Nov. 11

Advance Guard of 122 In. Engine Will Be Given Test in Coming Hoosier 500 Mile Event

By PAUL DUMAS

THE Monroe racer with which Gaston Chevrolet won the 1920 Indianapolis Speedway event has been overhauled at the Chevrolet shops. It will be raced this year by the Chevrolet Bros., who have chosen Wilbur D'Alene to supplant the deceased Gaston. Besides having undergone the well known treatments for the acquirement of speed as prescribed by its designer, the car will be fitted with a radio receiving outfit very similar to the Fronty Ford installation.

One designer at least has not been idle since the announcement of the inauguration of the 122 in. limit for the 1923 race. This one American designer is Frank E. Davidson of New York who will drive in the 1922 event his own pet, the DeWehr Special. The fact that the engine is of 122 in. entitles the entry to omit the mechanic. Davidson has taken advantage of this ruling and will ride alone, a rear vision mirror acting in the capacity of that honored institution, the mechanic. The rotary valved engine of this car has pistons of 2½ in. diameter and the stroke is 4¾.

With the latest refinements in low resistance bodies and the reduction in weight possible with a car of small dimensions, he is conceded a fair chance against the other higher powered entries. Indianapolis race fans who saw the splendid performance of the Andre Boillot 2½ litre Peugeot of 1919 know that this is no rash statement.

Whether any of the prominent engine designers of America have anything up their respective sleeves in the way of a 122 in. engine is not definitely known. If they have anything it would seem that this year's race would provide the rare opportunity of working out the inevitable bugs in time to correct the design for 1923.

The official contest personnel of this year's race includes two names that are well known as active participants in previous Indianapolis races. Eddie Rickenbacker who has traversed, at speed, both air and land, will be the official starter. The role of assistant has been assigned to another former contestant who really does not have to depend on the day's remuneration for his daily existence, Joe Boyer. Besides wealth Boyer is also the possessor of a family. The

race will be refereed by Richard Kennerdell who has been Contest Board Chairman of the A. A. A. for the past eight years.

Two of the largest radio broadcasting stations in Indiana will make special arrangements for the starting features, and after the race is under way will broadcast bulletins at half hour intervals tellings the progress of the race and important incidents. This service will be carried on throughout the day as the winner probably will not complete the distance much before four o'clock. Following the finish a complete review of the event and the ten prize winners will be broadcasted.

This is the first time that an automobile race has been reported by radio. Save for the gratification of the visual sense the hearers-in on these bulletins will have all of the enjoyments of witnessing in person. The starting bombs, the bands, and the roaring exhausts of the racers as they pass the stands will be audible to listeners hundreds of miles from the track.

The time trials will begin Thursday, May 25 and probably some time during that week will be held the Drivers' Exhibition Day. The receipts of this day are to be donated to the lap prize fund which this year has suffered somewhat from lack of contributions. An attractive lap prize purse is an assurance of a real fast race as it provides the necessary incentive to the contestants to keep the throttle just about against the stop, beginning with the first mile and to the last.

Right now the city of Indianapolis is preparing for the expected influx of some thousands of spectators. It has been stated that the hotel conditions and rooming house accommodations will be superior to any previous year. It is estimated from the advance sale of tickets that 150,000 people will see the race and 10,000 automobiles will be parked on the infield. Special solid Pullman trains will be operated from all of the surrounding large cities. These trains will arrive at Indianapolis Memorial day morning, the passengers will have breakfast aboard their train and return to their sleepers after the race to depart for home.

Among the betting fraternity it is difficult

to find an even money bet that the record established by De Palma, and so nearly equaled by Milton last year, will not be broken by some of the competing drivers this year.

The 500 mile Indianapolis races have always been of international prominence appealing both to the directly financial side of American and foreign engine designers and to the indirectly financial viewpoint as an agency for establishing prestige. Having outdone the east as a center of short and medium distance races the management of the San Carlos California Speedway has announced a 500 mile race to be held on Armistice day, November 11. It is anticipated that all of the surviving Indianapolis speed creations will migrate westward some time between June and November.

APRIL AUTOMOBILE SHIPMENTS

Washington, May 24.—In order that the production of automobile plants may not be in any way handicapped through delays in transportation, the Car Service Division of the American Railway Assn., in a circular just sent to all railroads, urges that all "automobile cars" be moved promptly, and that such cars should not be loaded with commodities that will leave a residue of dust, which may damage the finish of automobiles.

A new record for rail shipments of automobiles was established in April. Approximately 30,200 carloads were shipped in that month, compared with 20,187 during the same month one year ago, and 29,326 in March, 1920, which was the previous record month. Tabulations show that 15,357 carloads were shipped in January, 19,636 in February and 27,380 in March, this year.

RACINE TIRE CO. REORGANIZED

Racine, Wis., May 22—Reorganization of the defunct Racine Auto Tire Co. of Racine, is being effected through the incorporation of a new concern known as the Racine Horseshoe Tire Co., under the laws of Wisconsin, by O. W. Johnson, M. F. Eldred and F. K. Camp. The capitalization consists of 1,000 shares without par value.

Specifications of Current Motor Truck Models

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive			
				Front	Rear					Front	Rear					Front	Rear			
Acason.....RB	1 1/2	\$1650	3 1/2 x 5	34x5 1/2	34x5 1/2	W	Commerce.....25	2 1/2	\$2425	4 1/2 x 5 1/2	36x4	36x7	W	Garford.....70-H	2	\$2750	4 1/2 x 5 1/2	36x4	36x7	W
Acason.....H	1 1/2	1950	3 1/2 x 5 1/2	36x3 1/2	36x6	W	Concord.....A	2 1/2	3150	4 1/2 x 5 1/2	36x3 1/2	36x6	W	Garford.....77-D	3 1/2	3750	4 1/2 x 5 1/2	36x5	36x6 1/2	W
Acason.....L	1 1/2	2750	4 1/2 x 5 1/2	36x4 1/2	36x8	W	Concord.....B	3	3600	4 1/2 x 5 1/2	36x4	36x8	W	Garford.....68D	5	4500	5 x 6 1/2	36x6	40x6 1/2	W
Acason.....M	1 1/2	3450	4 1/2 x 5 1/2	36x5	36x10	W	Concord.....AX	2	3250	4 1/2 x 5 1/2	36x3 1/2	36x6	W	Garford.....150-A	7 1/2	5200	5 1/2 x 6	36x6	40x7 1/2	C
Acason.....C	1 1/2	4350	5 x 6 1/2	36x6	40x12	W	Concord.....BX	3	3600	4 1/2 x 5 1/2	36x4	36x8	W	Gary.....F	1-1 1/2	1675	3 1/2 x 5	36x3 1/2	36x6	W
Ace.....A	2 1/2	2295	3 1/2 x 5 1/2	34x3 1/2	34x5	W	Cook.....51	2 1/2	3600	4 1/2 x 5 1/2	36x6 1/2	40x8 1/2	W	Gary.....I	2 1/2	2150	4 1/2 x 5 1/2	36x3 1/2	36x6	W
Ace.....A	2 1/2	2795	4 1/2 x 5 1/2	36x4 1/2	36x7	W	Corbitt.....E-22	1 1/2	1490	3 1/2 x 5	34x3 1/2	34x4	W	Gary.....J	2 1/2	2550	4 1/2 x 5 1/2	36x4	36x8	W
Acme.....20	1 1/2	3150	3 1/2 x 5	35x5 1/2	35x5 1/2	W	Corbitt.....D-22	1 1/2	2200	3 1/2 x 5	34x3 1/2	34x4	W	Gary.....K	2 1/2	3550	4 1/2 x 6	36x5	40x5 1/2	W
Acme.....30	1 1/2	3150	3 1/2 x 5	34x3 1/2	34x5	W	Corbitt.....C-22	2	2600	4 1/2 x 5 1/2	36x3 1/2	36x6	W	Gary.....M	5	4000	5 x 6 1/2	36x6	40x6 1/2	W
Acme.....40	1 1/2	3150	3 1/2 x 5	34x3 1/2	34x5	W	Corbitt.....B-22	2 1/2	3000	4 1/2 x 5 1/2	36x4	36x7	W	Gersix.....M	1 1/2	3100	4 1/2 x 5 1/2	36x3 1/2	36x7	W
Acme.....60	3	3150	4 1/2 x 5 1/2	36x4	36x7	W	Corbitt.....R-22	3	3200	4 1/2 x 5 1/2	36x4	36x8	W	Gersix.....K	2 1/2	3500	4 1/2 x 5 1/2	36x4	36x8	W
Acme.....60L	3	3150	4 1/2 x 5 1/2	36x4	36x7	W	Corbitt.....AA-22	3 1/2	3800	4 1/2 x 5 1/2	36x5	36x10	W	Gersix.....L	3 1/2	4500	4 1/2 x 6	36x5	40x12	W
Acme.....90	4 1/2	4150	5 1/2 x 6 1/2	36x5	40x10	W	Corbitt.....AA-22	5	4500	4 1/2 x 6	36x6	40x6 1/2	W	Golden West.....GH	3	4500	4 1/2 x 6	36x7	36x7	W
Acme.....125	6 1/2	4150	5 1/2 x 6 1/2	36x6	40x12	W	Day-Elder.....AS	1	1600	3 1/2 x 5	35x5 1/2	35x5 1/2	W	Golden West.....G	3 1/2	5090	4 1/2 x 5 1/2	36x6	36x6	W
American.....25	2 1/2	3350	4 x 6	36x4 1/2	36x4 1/2	W	Day-Elder.....B	1 1/2	2000	3 1/2 x 5	34x3 1/2	34x5	W	Graham Bros.....1-Ton	1	1205	3 1/2 x 4 1/2	33x4 1/2	34x5 1/2	B
American.....40	4	4275	4 1/2 x 6	36x5 1/2	36x5 1/2	W	Day-Elder.....D	2	2400	4 1/2 x 5 1/2	36x4	36x7	W	Graham Bros.....1 1/2-Ton	1 1/2	1325	3 1/2 x 4 1/2	33x4 1/2	36x6 1/2	B
Apex.....G	1	1450 1/2	3 1/2 x 5	33x5 1/2	33x5 1/2	W	Day-Elder.....C	2 1/2	2750	4 1/2 x 5 1/2	36x4	36x7	W	Gramm-Pion.....10	1 1/2	1365	3 1/2 x 5	33x5 1/2	33x5 1/2	B
Apex.....D	1 1/2	1915	3 1/2 x 5 1/2	34x3 1/2	34x4	W	Day-Elder.....F	3 1/2	3180	4 1/2 x 5 1/2	36x5	36x5 1/2	W	Gramm-Pion.....15	1 1/2	1900	3 1/2 x 5	36x3 1/2	36x5	W
Apex.....E	2 1/2	2695	4 1/2 x 5 1/2	36x4	36x7	W	Day-Elder.....E	5	4250	4 1/2 x 6	36x5	40x6 1/2	W	Gramm-Pion.....20	2	2500	4 1/2 x 5 1/2	36x4	36x7	W
Apex.....F	3 1/2	3975	4 1/2 x 6	36x5	36x10	W	Dearborn.....E	1 1/2	1600	3 1/2 x 5 1/2	35x5 1/2	35x5 1/2	W	Gramm-Pion.....20 1/2	2 1/2	2925	4 1/2 x 5 1/2	36x4	36x7	W
Armstrong.....20	1	2350	3 1/2 x 5	34x3 1/2	34x5	W	Dearborn.....FX	1 1/2	2300	3 1/2 x 5 1/2	34x4	34x5	W	Gramm-Pion.....30	3	3275	4 1/2 x 5 1/2	36x4	36x7	W
Armstrong.....21	1 1/2	2125	3 1/2 x 5 1/2	34x3 1/2	34x6	W	Dearborn.....F	1 1/2	2180	3 1/2 x 5 1/2	34x4	34x5	W	Gramm-Pion.....40	4	4225	4 1/2 x 5 1/2	36x5	36x5 1/2	W
Armstrong.....40	1 1/2	2850	4 1/2 x 5 1/2	36x4	36x6	W	Dearborn.....48	2	2690	4 1/2 x 5 1/2	34x4 1/2	34x7	W	Gramm-Pion.....50	5-6	4895	4 1/2 x 6	36x6	40x6 1/2	W
Armstrong.....HW	1 1/2	3200	4 1/2 x 5 1/2	36x4 1/2	36x7	W	Defiance.....G	1	1695	3 1/2 x 5	35x5 1/2	35x5 1/2	B	Hahn.....H2	1	1700	3 1/2 x 5	34x5	34x5	W
Armstrong.....KW	1 1/2	4160	4 1/2 x 5 1/2	36x5	36x12	D	Defiance.....D	1 1/2	2095	3 1/2 x 5	35x5 1/2	36x6 1/2	W	Hahn.....O	1 1/2	1900	4 1/2 x 5 1/2	36x3 1/2	36x6	W
Atco.....B	1 1/2	3150	3 1/2 x 5 1/2	34x5 1/2	36x6 1/2	W	Defiance.....E	2	2275	3 1/2 x 5	35x5 1/2	36x7 1/2	W	Hahn.....K	2	2225	4 1/2 x 5 1/2	36x4	36x8	W
Atco.....B1	1 1/2	3150	3 1/2 x 5 1/2	34x5 1/2	36x6 1/2	W	DeMartini.....1	1 1/2	2000	3 1/2 x 5	34x3 1/2	34x6	W	Hahn.....L	3	2900	4 1/2 x 6	36x5	36x10	W
Atlas.....A	1 1/2	3150	3 1/2 x 5 1/2	36x4 1/2	36x8	W	DeMartini.....2	2	3300	4 x 5 1/2	36x3 1/2	36x7	W	Hahn.....M	5	3500	4 1/2 x 6	36x6	40x12	W
Atterbury.....MD	1	1185	3 1/2 x 5	32x4 1/2	32x4 1/2	W	DeMartini.....3	3	4250	4 1/2 x 6	36x4	36x10	W	Hahn.....N	6	4500	4 1/2 x 6	36x6	40x12	W
Atterbury.....7C1	1 1/2	2475	3 1/2 x 5	34x3 1/2	34x5	W	DeMartini.....4	4	4800	4 1/2 x 6	36x6	36x12	W	Hal-Fur.....E	1 1/2	2350	4 x 5 1/2	36x6	38x7 1/2	W
Atterbury.....7D	1 1/2	3175	3 1/2 x 5 1/2	36x4	36x4 1/2	W	Denby.....31	1 1/2	1435	3 1/2 x 5	35x5 1/2	35x5 1/2	W	Hal-Fur.....D	2 1/2	3000	4 1/2 x 5 1/2	36x6	36x8	W
Atterbury.....8E	5	4975	4 1/2 x 6	36x5	40x6 1/2	W	Denby.....33	1 1/2	2145	3 1/2 x 5	35x5 1/2	36x7 1/2	W	Hall.....1 1/2	1 1/2	3100	3 1/2 x 5	34x5	38x7 1/2	W
Autocar.....21UF	1 1/2	1950	3 1/2 x 5	34x4 1/2	34x5	D	Denby.....34	2	2395	3 1/2 x 5	36x3 1/2	36x6	W	Hall.....2 1/2	2 1/2	3275	4 1/2 x 5 1/2	36x4	36x6	W
Autocar.....21UC	1 1/2	2050	3 1/2 x 5	34x4 1/2	34x5	D	Denby.....35	2 1/2	2795	3 1/2 x 5 1/2	36x4	36x7	W	Hall.....3 1/2	3 1/2	4100	4 1/2 x 5 1/2	36x5	36x6 1/2	W
Autocar.....27H	1 1/2	2950	4 x 5 1/2	34x5	36x7	D	Denby.....210	5	4295	4 1/2 x 5 1/2	36x6	40x6 1/2	W	Hall.....5	5	5100	4 1/2 x 5 1/2	36x5	40x6 1/2	W
Autocar.....27K2	2	3075	4 x 5 1/2	34x5	36x7	D	Dependable.....A	3 1/2	1650	3 1/2 x 5 1/2	34x5 1/2	36x6 1/2	W	Hall.....7 chain	7	5100	4 1/2 x 5 1/2	36x5	40x6 1/2	W
Autocar.....26T	5	3350	4 1/2 x 5 1/2	36x6	36x12	D	Dependable.....C	2 1/2	2350	3 1/2 x 5 1/2	34x3 1/2	34x5	W	Harvey.....WOA	3	2650	4 1/2 x 5 1/2	36x4	36x7	W
Autocar.....26-B	5	4100	4 1/2 x 5 1/2	36x6	36x12	D	Dependable.....D	2 1/2	2650	4 x 5 1/2	34x5	36x6	W	Harvey.....WFA	2	2950	4 1/2 x 5 1/2	36x4	36x7	W
Available.....H1 1/2	1 1/2	2175	4 x 5	36x3 1/2	36x5	W	Dependable.....E	3	2950	4 1/2 x 5 1/2	36x4	36x7	W	Harvey.....WHA	3 1/2	3950	4 1/2 x 6	36x5	36x5 1/2	W
Available.....H2	2	2775	4 x 5	36x3 1/2	36x6	W	Diamond T.....O-8	1-1 1/2	1075	3 1/2 x 5	36x3 1/2	36x4 1/2	W	Hawkeye.....K	1 1/2	1850	3 1/2 x 5 1/2	34x3 1/2	34x5	W
Available.....H2 1/2	2 1/2	3160	4 x 5	36x4	36x8	W	Diamond T.....T	1 1/2	2250	3 1/2 x 5 1/2	36x3 1/2	36x5	W	Hawkeye.....M	2	2650	4 1/2 x 5	36x4	36x6	W
Available.....H3 1/2	3 1/2	4175	4 1/2 x 5 1/2	36x5	40x5 1/2	W	Diamond T.....U	2-2 1/2	2650	4 x 5 1/2	36x4	36x7	W	Hawkeye.....N	3 1/2	3700	4 1/2 x 5 1/2	36x5	36x10	W
Available.....H5	5	5375	5 x 6	36x6	40x12	W	Diamond T.....K	3 1/2	3750	4 1/2 x 5 1/2	36x5	36x5 1/2	W	Hendrickson.....O	1 1/2	2200	3 1/2 x 5 1/2	36x4	36x5 1/2	W
Avery.....1	1	1850	3 x 5	32x4 1/2	33x5	W	Diamond T.....EL	5	4325	4 1/2 x 5 1/2	36x6	40x6 1/2	W	Hendrickson.....N	2 1/2	2690	4 1/2 x 5 1/2	36x4	36x7	W
Beck.....A Jr.	1 1/2	2050	3 1/2 x 5	34x5	36x6	W	Diesel.....A	1 1/2	1350	3 1/2 x 5	34x4 1/2	34x4 1/2	W	Hendrickson.....K	3	3000	4 1/2 x 5 1/2	36x5	36x5 1/2	W
Beck.....B	1 1/2	2150	3 1/2 x 5	36x6	36x6	W	Dispatch.....F	1	1350	3 1/2 x 5	34x4 1/2	34x4 1/2	W	Hendrickson.....K	4	4000	5 x 6 1/2	36x6	40x6	W
Beck.....C-40	2 1/2	2850	4 1/2 x 5 1/2	36x7	40x8	W	Doane.....2 1/2	2><												

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL		Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL		Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive
					Front	Rear							Front	Rear	
Kimball	AC	2½	\$3975	4½x6	36x4	36x8	W	Northwestern	WS	1½	2700	4½x5½	34x4	36x6	W
Kimball	AK	3	4500	4½x6	36x4	36x10	W	Northwestern	WS	2½	3500	4½x5½	36x4	36x8	W
Kimball	AE	4	5000	4½x6	36x5	40x12	W	Norwalk	25E	1	1595	3½x5	34x3½	34x4	W
Kimball	AF	5	5500	5 x 6	36x6	40x7d	W	Norwalk	35E	1½	1925	3½x5	34x3½	34x3½d	W
Kissel	Express	1	1555†	3½x5½	34x5½	34x5½	W	Norwalk	35E-Spec	1½	2285	3½x5½	34x3½	34x5	W
Kissel	Utility	1½	1975	3½x5½	36x3½	36x5	W	O. K.	K1	1½	2450	4 x 5½	36x3½	36x5	W
Kissel	Freighter	2½	2975	4½x5½	36x4	36x7	W	O. K.	L1	2½	3250	4½x5½	36x4	36x8	W
Kissel	H. D.	4	3675	4½x5½	36x5	36x5½	W	O. K.	M1	3½	4250	4½x6	36x5	36x5d	W
Kleiber	AA	1½	2200	4½x5½	34x3½	34x5*	W	Ogden	D	1½	...	3½x5	36x3½	36x5	W
Kleiber	A	1½	3100	4½x5½	36x3½	36x6*	W	Ogden	D	1½	...	3½x5	36x3½	36x5	W
Kleiber	BB	2	3000	4½x5½	36x4*	36x7*	W	Ogden	E	2½	...	4½x5½	36x4	36x8	W
Kleiber	B	2½	3950	4½x5½	36x5*	36x8	W	Old Hickory	W	1	1775	3½x5	36x3½	36x4*	W
Kleiber	C	3	4600	4½x5½	36x5	36x5d	W	Old Reliable	A	1½	2350	4 x 5	34x4	36x6	W
Kleiber	D	3	5300	5 x 6½	36x6	40x12	W	Old Reliable	B	2½	3500	4½x6	34x4	36x4d	W
Koehler	D	1½	1995	3½x5	34x3½	34x5	W	Old Reliable	C	3½	4250	4½x6	36x5	36x5d	W
Koehler	M	2½	3175	4 x 5½	36x4	36x7	W	Old Reliable	D	5	5250	4½x6	36x6	40x6d	W
Koehler	MCS	2½	3275	4 x 5½	36x4	36x7	W	Old Reliable	KLM	7	6000	4½x6	36x6	40x7d	C
Koehler	F	3½	4150	4½x5½	36x5	36x10	W	Oldsmobile Econ.	1	1095	3½x5½	34x5†	35x5†	I	
Koehler	MT Trac	5	3275	4 x 5½	36x4	36x7	W	Olympic	A	2½	3290	3½x5½	36x4	36x8	W
Krebs-Collier	23	¾	1260	3½x5	34x4½	34x4½	B	Oshkosh	A	2	3250	3½x5	36x6†	36x6†	4
Krebs-Collier	24	1	1565	3½x5	34x5	34x5	W	Oshkosh	AA	2	3100	3½x5	36x6†	36x6†	4
Krebs-Collier	45	1½	2125	4½x5½	36x4	36x7	W	Oshkosh	B	2½	3850	4 x 5½	38x7†	38x7†	4
Krebs-Collier	75	2½	2375	4½x5½	36x4	36x8	W	Oshkosh	BB	2½	4000	4 x 5½	38x7†	38x7†	4
Krebs-Collier	110	3½	2975	4½x5½	36x5	40x10	W	Overland	4	½	450	3½x4	36x3½	36x3½	B
Lange	B	2½	3350	4½x5½	36x4*	36x7*	C	Packard	EC	1½-3	3100	4½x5½	36x4	36x7	W
Larabee	X-2	1	1925	3½x4½	34x5†	34x5†	B	Packard	EX	1½-3	3100	4½x5½	36x6†	40x8†	W
Larabee	U	1½	2100	3½x5	34x3½	34x5*	W	Packard	ED	2-4½	4100	4½x5½	36x5	36x5d	W
Larabee	J	1½-2½	2400	3½x5	34x3½	34x5*	W	Packard	EF	4-7½	4500	5 x 5½	36x6	40x6d	W
Larabee	K	2½	3100	4½x5½	36x4	36x7	W	Paige	52-19	1½	1950	4 x 5½	34x3½	34x5	W
Larabee	K-5	2½-3	3450	4½x5½	36x5	36x8	W	Paige	54-26	2½	2420	4½x5½	34x4	34x8	W
Larabee	L-4	3	4030	4½x5½	36x5	36x5d	W	Paige	51-18	3½	3145	4½x5½	36x5	36x5d	W
Larabee	W	5	4930	4½x6	36x6	40x6d	W	Parker	C-22	1	1875	3½x5½	34x5†	34x5†	W
Luedinghaus	C	1	1600	3½x5	34x5†	34x5†	W	Parker	G-22	2½	3200	4½x6	34x4	36x4d	W
Luedinghaus	W	1½	2400	3½x5	34x5†	34x5†	W	Parker	J-20	3½	3950	4½x6	36x5	40x5d	W
Luedinghaus	K	2-2½	790	4½x5½	36x4*	36x7*	W	Parker	M-20	5	4850	5 x 6	36x6	40x6d	W
Maccar	L	1½	2740	4½x5½	36x4	36x6	W	Patriot	Reverse	1	1380	3½x5	35x5†	35x5†	W
Maccar	H-A	2	3100	4½x5½	36x4	36x4d	W	Patriot	Lincoln	2	2050	4 x 5½	34x3½	34x5	W
Maccar	H-2	3	3400	4½x5½	36x4	36x5d	W	Patriot	Washt'n	3	2900	4½x5½	36x4	36x7	W
Maccar	H-3	4	4200	4½x5½	36x5	36x6d	W	Piedmont	4-30	1	1200	3½x5	34x4†	34x4†	W
Maccar	G	5-6	4050	4½x6	36x5	40x6d	W	Pierce-Arrow	5	1550	3½x4½	32x4½†	32x4½†	W	
MacDonald	A	7½	5750	4½x6	36x5	40x6d	I	Pierce-Arrow	5	1550	3½x4½	32x4½†	32x4½†	W	
Mac	AB D.R.	1½	3150	4½x5½	36x4	36x3½	I	Pierce-Arrow	5	1550	3½x4½	32x4½†	32x4½†	W	
Mac	AB Chain	1½	3000	4 x 5	36x4	36x3½	C	Pioneer	59	1½-2	3000	3½x4½	32x4½†	32x4½†	I
Mac	AB Chain	2	3300	4 x 5	36x4	36x4	D	Pittsburgher	3	3800	4½x5½	36x5*	36x8	W	
Mac	AB D.R.	2½	3750	4 x 5	36x4	36x4d	D	Pittsburgher	3	3800	4½x5½	36x5*	36x8	W	
Mac	AB D.R.	2½	3850	4 x 5	36x4	36x4d	D	Power	F	2	3150	3½x5½	36x5	36x7	W
Mac	AB Chain	2½	4100	4 x 5	36x4	36x4d	C	Power	F	2	3150	3½x5½	36x5	36x7	W
Mac	AC Chain	3	4950	5 x 6	36x5	40x5d	C	Rainier	R-21	¾	...	3½x5	35x5†	35x5†	W
Mac	AC Chain	5	5500	5 x 6	36x6	40x6d	C	Rainier	R-25	1	...	3½x5	34x3½	34x4	W
Mac	AC Chain	6	5750	5 x 6	36x6	40x6d	C	Rainier	R-26	1½	...	3½x5	34x3½	34x5	W
Mac	AC Chain	7	6000	5 x 6	36x7	40x7d	C	Rainier	R-28	2	...	3½x5½	34x4	34x6	W
Mac	AC Chain	7	6400	5 x 6	36x7	40x7d	C	Rainier	R-20	2½-3	...	4½x5½	34x4	34x7	W
Mac	AC Chain	7	6800	5 x 6	36x7	40x7d	C	Rainier	R-15	3½-5	...	4½x5½	36x5	36x5d	W
Mac	AC Chain	7	7200	5 x 6	36x7	40x7d	C	Rainier	R-17	5-6	...	4½x6	36x6	40x6d	W
Mac	AC Chain	7	7600	5 x 6	36x7	40x7d	C	Ranger	TK-22-2	1½	2450	3½x5	36x6†	38x7†	W
Mac	AC Chain	7	8000	5 x 6	36x7	40x7d	C	Reo	F	1½-1	1245	3½x4½	34x4½†	34x4½†	B
Mapleleaf	AA*	2	3775	4 x 5½	36x4	36x7	W	Reliance	10A	1½	2400	4 x 5½	36x3½	36x5	I
Mapleleaf	BB*	3	4350	4½x5½	36x4	36x4d	W	Reliance	20B	1½	2400	4 x 5½	36x3½	36x5	I
Mapleleaf	CC*	4	5100	4½x5½	36x5	36x5d	W	Republic	75	1	1395	3½x5	34x4	32x4½†	I
Mapleleaf	DD*	5	6200	4½x5½	36x6	40x6d	W	Republic	10	1	1395	3½x5	34x4	32x4½†	I
Mapleleaf	JW	1½	2290	4½x5½	34x3½	34x5	W	Republic	10 Exp	1	1695	3½x5	35x5†	34x5†	I
Master	JD	1½	2290	4½x5½	34x3½	34x5	W	Republic	11X	1½	1795	3½x5	34x3½	34x6	I
Master	Z	2	2590	4½x5½	34x3½	34x5	W	Republic	19	2½	2195	4½x5½	36x4	36x7	I
Master	W	2½	2890	4½x5½	34x4	36x7	W	Republic	20	3½	3095	4½x5½	36x5	36x10	I
Master	DD	2½	3190	4½x5½	4½x4	36x7	W	Rowe	CW	1½	3000	3½x5	36x6†	36x6†	W
Master	A	3½	3990	4½x6	36x5	40x5d	D	Rowe	C.D.W.	2	3300	4 x 5	34x4	36x3½d	W
Master	E	3½	4290	4½x6	36x5	40x5d	D	Rowe	G.S.W.	3	4150	4 x 5	34x5	36x5d	W
Master	Y	4	4490	4½x6	36x5	40x6d	D	Rowe	G.P.W.	3	5250	4½x6	38x7†	42x9†	W
Master	B	5	4990	4½x6½	36x6	40x6d	W	Rowe	HW	4	4500	4½x6	36x5	36x6d	W
Master	F	5	5090	4½x6½	36x6	40x6d	W	Rowe	F.W.	5	5500	4½x6	36x6	40x6d	W
Master Trac	DDT	6	3390	4½x5½	34x4	36x7	W	Ruggles	20	1	1195	3½x5	34x5†	34x5†	B
Maxwell	1½	932	3½x4½	32x3	32x4	W	Ruggles	40	2	1795	4 x 5	34x5†	34x5†	D	
Menominee	HT	1-1½	2000	3½x5	34x3½	36x5	W	Sandow	G	1	2295	3½x5	34x3½	34x5	W
Menominee	H	1½	2175	4 x 5	36x3½	36x5	W	Sandow	CG	1½	2590	3½x5	34x4	34x6	W
Menominee	D	2-2½	2875	4 x 6	36x4	36x8	W	Sandow	J	2½	3275	4½x5½	36x4	36x7	W
Menominee	G	3	3800	4½x6	36x5	36x10	W	Sandow	M	3½	4295	4½x5½	36x5	36x5d	W
Menominee	J-3	5	4850	4½x6	36x6	40x12	W	Sandow	L	5	4				

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive
				Front	Rear						Front	Rear						Front	Rear	
Vim.....29	12	\$1050	3 1/2 x 4 1/2	31x4 1/2	31x4 1/2	W	White.....15	2 1/2	\$2400	3 1/2 x 5 1/2	34x5 1/2	34x5 1/2	B	Wilcox.....D	2 1/2	\$3000	4 1/2 x 5	36x4*	36x3 1/2	d*W
Vim.....30	12	1175	3 1/2 x 4 1/2	32x4 1/2	32x4 1/2	W	White.....20	2 1/2	3250	3 1/2 x 5 1/2	36x4*	36x7	D	Wilcox.....E	3 1/2	3050	4 1/2 x 5	36x5*	36x5 1/2	W
Vim.....31	12	1975	3 1/2 x 5 1/2	35x5 1/2	35x5 1/2	W	White.....40	4	4200	3 1/2 x 5 1/2	36x5	40x5 1/2	D	Wilcox.....F	5	4350	4 1/2 x 5 1/2	36x5	40x5 1/2	W
Vim.....22	12	3150	3 1/2 x 5 1/2	36x4	36x6	W	White.....45	5	4500	3 1/2 x 5 1/2	36x6	40x6 1/2	D	Wilson.....F	1 1/2	2270	3 1/2 x 5 1/2	36x3 1/2	36x5	W
Vim.....23	3	3950	4 1/2 x 5 1/2	36x5	36x5 1/2	W	White Hick.....E	1 1/2	1225	3 1/2 x 5	34x5 1/2	34x5 1/2	W	Wilson.....EA	2 1/2	2325	4 1/2 x 5 1/2	36x4	36x7	W
Vulcan.....25	2 1/2	4000	4 1/2 x 5	36x4	36x5	W	White Hick.....H	1 1/2	1375	3 1/2 x 5	36x3 1/2	36x5	W	Wilson.....G	3 1/2	3685	4 1/2 x 5 1/2	36x5	36x5	W
Vulcan.....25P	3 1/2	4500	4 1/2 x 5	36x6	40x8	W	White Hick.....K	2 1/2	1675	4 1/2 x 5 1/2	36x4	36x5	W	Wilson.....H	5	4520	4 1/2 x 5	36x6	40x6	W
							Wichita.....M	1	1875	3 1/2 x 5 1/2	36x3 1/2	36x4*	W	Wisconsin.....A	1	1750	3 1/2 x 5	34x5 1/2	34x5 1/2	W,B
Walker-Johnson A	2	2250	3 1/2 x 5	34x3 1/2	34x6	W	Wichita.....N	2	2400	3 1/2 x 5 1/2	36x3 1/2	36x6*	W	Wisconsin.....B	1 1/2	2100	3 1/2 x 5	35x5	36x6	W
Walker-Johnson B	3	2750	4 1/2 x 5 1/2	36x4	36x8	W	Wichita.....RX	3	3200	4 1/2 x 5 1/2	36x4*	36x8*	W	Wisconsin.....C	2 1/2	2700	4 1/2 x 5 1/2	36x6*	36x7	W
Walter.....S	5	4850	4 1/2 x 5 1/2	36x6	40x6 1/2	W	Wichita.....O	4	3500	4 1/2 x 5 1/2	36x5*	36x5*	W	Wisconsin.....D	3 1/2	3000	4 1/2 x 5 1/2	36x6*	40x8	W
Ward-LaF.....2B	2	2990	4 1/2 x 5 1/2	36x4	36x4 1/2	W	Wilcox.....AA	1 1/2	1900	3 1/2 x 5 1/2	36x1*	36x1*	W	Wisconsin.....E	5	3500	4 1/2 x 5 1/2	36x6	36x10	W
Ward-LaF.....4A	3	3990	4 1/2 x 5 1/2	36x5	36x5 1/2	W	Wilcox.....BB	1 1/2	2550	4 1/2 x 5	36x1	36x5	W	Wisconsin.....F	7	4000	5 x 6 1/2	36x6	36x12	W
Ward-LaF.....5A	5	4590	5 x 6 1/2	36x6	40x6 1/2	W								Witt-Will.....N	1 1/2	2250	3 1/2 x 5	36x3 1/2	36x5*	W
Watson.....B	1	1965	3 1/2 x 5 1/2	35x5 1/2	35x5 1/2	W								Witt-Will.....P	2 1/2	2750	4 1/2 x 5 1/2	36x3 1/2	36x7*	W
Watson.....N	1	4250	4 1/2 x 5 1/2	36x5	36x10	W	*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl.													
Western.....W1 1/2	1 1/2	2850	4 1/2 x 5 1/2	36x3 1/2	36x5*	W	Trac. Tractor. **Canadian made.													
Western.....L1 1/2	1 1/2	2550	4 1/2 x 5	36x3 1/2	36x5*	W	Final Drive: W—Worm, I—Internal Gear, C—Chains, D—													
Western.....W2 1/2	2 1/2	3250	4 1/2 x 5 1/2	36x4	36x7	W	Double Reduction, B—Bevel, 4—Four-Wheel, E—External													
Western.....L2 1/2	2 1/2	3250	4 1/2 x 5	36x4	36x7	W	Gear. *Tires—optional. †Pneumatic Tires. d—dual. All													
Western.....W3 1/2	3 1/2	4250	4 1/2 x 5	36x5	40x5 1/2	W	others solid. ‡Price includes body. §—Price includes													
							several items of equipment.													

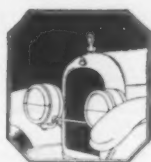
*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl.
Trac., Tractor. **Canadian made.
Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. ‡Dual. All others solid. ††Price includes body. ‡—Price includes several items of equipment.

Specifications of Current Farm Tractor Models

TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Plow Capacity	TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Plow Capacity	TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Plow Capacity
Allis-Chalm. G.P.	6-12	\$250	2	LeR.	4-3 1/2 x 4 1/2	Gas.	1	Franklin.....G2	18-30	\$4350	2	Clim.	4-5 x 6 1/2	G or K	3-4	Pearis.....L	12-25	1615	4	Clim.	4-5 x 6 1/2	G,K	3
Allis-Chalm. B	6-12	325	2	LeR.	4-3 1/2 x 4 1/2	G	1	Frick.....A	12-20	.....	4	Erld.	4-4 x 6	G,K	2-3	Pioneer.....G	18-36	1750	4	Own	4-5 1/2 x 6	G,K,D	4
Allis-Chalm. C	15-25	1185	4	Midw.	4-4 1/2 x 5 1/2	Gas.	3	Frick.....C	15-28	.....	4	Beav.	4-4 1/2 x 6	G,K	3-4	Pioneer.....H	40-75	3550	4	Own	4-7 x 8	Gas.	10
Allis-Chalm. D	20-35	1895	4	Own	4-4 1/2 x 6 1/2	G or K	3-4	Grain Belt.....A	18-36	2150	4	Wauk.	4-4 1/2 x 6 1/2	G or K	4	Ploverman.....A	4-75	1205	4	Buda	4-4 1/2 x 6	G,K	3-4
Allis-Chalm. E	20-35	2085	4	Own	4-4 1/2 x 6 1/2	G	4	Gray.....1920	18-36	.....	3	Wauk.	4-4 1/2 x 6 1/2	Gas.	4	Reliable.....	10-20	300	4	Own	2-6 x 7	Ker.	2
Allwork.....2-G	14-28	1095	4	Own	4-4 1/2 x 6	G or K	3	Gt. Western St.	20-30	1950	4	Beav.	4-4 1/2 x 6	K	4	Res.....	12-25	1600	4	Wauk.	4-4 1/2 x 5 1/2	G or K	3
Allwork.....C	11-28	1395	4	Own	4-5 x 6	G or K	4	Hart-Parr.....20	20	945	4	Own	2-5 1/2 x 6 1/2	K,D	2	Russell.....	12-21	1500	4	Own	4-4 1/2 x 5 1/2	G or K	2-3
Andrews-Kin.D	18-36	2500	4	Clim.	4-5 x 6 1/2	G or K	4	Hart-Parr.....30	30	1295	4	Own	2-6 1/2 x 7	K,D	3	Russell.....	15-30	2200	4	Own	4-5 x 6 1/2	G or K	3-4
ARO.....1921-22	3-6	385	4	Own	1-4 1/2 x 5	G,K	1	Heider.....D	9-16	870	4	Wauk.	4-4 1/2 x 6 1/2	G,K	3	Russell.....	20-35	3000	4	Own	4-5 1/2 x 7	G or K	4-5
Aultman-T.....	15-30	2200	4	Clim.	4-5 x 6 1/2	G,K	4	Heider.....C	8-10	800	4	LeR.	4-3 1/2 x 4 1/2	Gas.	1	Russell.....	30-60	5000	4	Own	4-8 x 10	G or K	8-10
Aultman-T.....	22-45	3420	4	Own	4-5 1/2 x 6 1/2	G,K	6	Heider.....Cult	12-20	995	4	Wauk.	4-4 1/2 x 6 1/2	G,K	3	Samson.....M	.....	445	4	Own	4-4 x 5 1/2	G,K	2
Aultman-T.....	30-60	4500	4	Own	4-7 x 8	G,K,D	8-10	Huber Light 4	12-25	1185	4	Wauk.	4-4 1/2 x 5 1/2	G or K	3	Sandusky.....J	10-20	1250	4	Own	4-4 1/2 x 5 1/2	G,K,D	2
Automet.....B-3	12-24	1250	4	Here.	4-4 x 5 1/2	Gas.	2-3	Huber Super 4	15-30	1885	4	Midw.	4-4 1/2 x 6	Gas.	3	Sandusky.....E	15-35	1750	4	Own	4-5 x 6 1/2	G,K,D	4
Avery, S.H. Cal.	5-10	.....	4	Own	4-3 x 4	G,K	2	Illinois, Super-Drive.....C	15-30	.....	4	Clim.	4-5 x 6 1/2	G,K	4	Shelby.....D	15-30	.....	4	Beav.	4-4 1/2 x 6	G,K	3
Avery.....Cult-C	5-10	.....	3	Own	4-3 x 4	G,K	2	Imperial.....E	40-70	4500	4	Own	4-7 1/2 x 9	G,K,D	10	Shelby.....C	9-18	.....	4	Wauk.	4-3 1/2 x 5 1/2	G or K	2
Avery.....B	5-10	.....	4	Own	6-3 x 4	G,K	2	Indiana.....F	5-10	665	2	LeR.	4-3 1/2 x 4 1/2	Gas.	1-2	Steady Pull.....	12-24	1185	4	Own	4-4 x 5	Gas.	3
Avery.....C	8-16	.....	4	Own	6-3 x 4	G,K	2	International.....	8-16	1670	4	Own	4-4 1/2 x 5	G,K,D	2	Stinson.....4E	18-36	1835	4	Beav.	4-4 1/2 x 6	G,K	4
Avery.....	12-20	.....	4	Own	4-4 1/2 x 6	G,K,D	3-4	Internat. Titan	10-20	1700	4	Own	2-6 1/2 x 8	G,K,D	3	Tiga.....3	18-32	.....	4	Wisc.	4-4 1/2 x 6	Gas.	3-4
Avery.....	12-25	.....	4	Own	2-6 1/2 x 7	G,K,D	3-4	International.....	15-30	1750	4	Own	4-5 1/2 x 8	G,K,D	4	Top-Stewart.....	30-45	.....	4	Wauk.	4-4 1/2 x 6 1/2	Gas.	3-4
Avery.....	14-28	.....	4	Own	4-4 1/2 x 6	G,K,D	3-4	J-T.....N	20-40	.....	2	Clim.	4-5 x 6 1/2	G,K,D	3-4	Toro-Cultivator.....	6	750	3	LeR.	4-3 1/2 x 4 1/2	Gas.	2
Avery.....	18-36	.....	4	Own	4-5 1/2 x 6	G,K,D	4-5	Lauson.....S	12-25	1495	4	Midw.	4-4 1/2 x 6 1/2	Gas.	3	Toro-Tractor 22.....	6-10	495	3	LeR.	4-3 1/2 x 4 1/2	Gas.	2
Avery.....	25-50	.....	4	Own	4-6 1/2 x 7	G,K,D	5-6	Lauson.....20	15-30	1875	4	Beav.	4-4 1/2 x 6	G or K	3-4	Townsend.....	10-20	800	2	Own	4-6 1/2 x 7	Ker.	2-3
Avery.....	45-65	.....	4	Own	4-7 1/2 x 8	G,K,D	8-10	Lauson.....21	15-30	2100	4	Beav.	4-4 1/2 x 6	K	3-4	Townsend.....	15-30	1350	2	Own	4-7 x 8	Ker.	3-4
Bates Mule H	15-25	.....	4	Midw.	4-4 1/2 x 5 1/2	Gas.	3	Lauson Read	15-30	2100	4	Beav.	4-4 1/2 x 6	G or K	3-4	Townsend.....	25-50	2500	2	Own	4-8 1/2 x 10	Ker.	4-8
Bates Mule F	18-25	.....	2	Midw.	4-4 1/2 x 6	Gas.	3	Leader.....B	12-18	685	4	Own	2-6 x 6 1/2	G,K,D	2-3	Tractor Motor.....	40-50	.....	4	LeR.	8-31 x 5	Gas.	4-5
Bates Mule G	25-35	.....	2	Midw.	4-4 1/2 x 6	Gas.	3	Leader.....N	16-32	1725	4	Clim.	4-5 x 6 1/2	G,K	3-4	Traylor.....TB	6-12	500	4	LeR.	4-3 1/2 x 4 1/2	Gas.	1-2
Boeman.....G	2-4	240	4	Own	1-3 1/2 x 4 1/2	Gas.	.....	Leader.....GU	18-35	2150	2	Clim.	4-5 x 6 1/2	G,K	3-4	Trundar.....10	25-40	3750	2	Wauk.	4-5 x 6 1/2	G or K	4
Best.....	18-30	3100	2	Own	4-4 1/2 x 6 1/2	G,K,D	4	Linn.....H4J	40	4500	2	Cont.	4-4 1/2 x 5 1/2	Gas.	4	Twin City.....	12-20	1701	4	Own	4-4 1/2 x 6	G,K	3
Best.....	00	5450	2	Own	4-6 1/2 x 8 1/2	G,K,D	8-9	Linn.....W	60	5000	2	Wauk.	4-5 x 6 1/2	Gas.	6	Twin City.....	20-35	2750	4	Own	4-5 1/2 x 6 1/2	G,K	5-6
Boring.....1921	.....	1850	3	Wauk.	4-4 1/2 x 8 1/2	G or K	2	Little Giant.....B	16-22	2200	4	Own	4-4 1/2 x 5	K	4	Twin City.....	40-65	4750	4	Own	4-7 1/2 x 9	G,K	8-10
Burn-Oil.....1922	15-30	1435	4	Own	2-6 1/2 x 7	Ker.	3-4	Little Giant.....A	26-35	3300	4	Own	1-5 1/2 x 6 1/2	K	6	Uncle Sam C20.....	12-20	1295	4	Weid.	4-4 x 5 1/2	G	2-3
Capital.....	15-30	1000	2	Own	4-4 1/2 x 6	Gas.	2	Lombard.....1922	85-150	8950	2	Wisc.	6-5 1/2 x 6 1/2	Gas.	16	Uncle Sam B19.....	20-30	1985	4	Beav.	4-4 1/2 x 6	G or K	3-4
Case.....	10-18	700	4	Own	4-3 1/2 x 5	G or K	2	Lombard.....1922	50	5300	2	Wisc.	4-4 1/2 x 6 1/2	Gas.	1-10	Uncle Sam D21.....	20-30	1895	4	Beav.	4-4 1/2 x 6	G or K	3-4
Case.....	12-20	1050	4	Own	4-4 1/2 x 5	G,K,D	3	Lombard.....1922	50	5300	2	Wisc.	4-4 1/2 x 6 1/2	Gas.	1-10	Utiliter.....501	2 1/2-4	295	4	Own	1-3 1/2 x 4 1/2	G	1
Case.....	15-27	1320	4	Own	4-4 1/2 x 6	G or K	3-4	Master Jr.....	5-10	585	2	LeR.	2-3 1/2 x 4	Gas.	1	Vim.....B	15-30	1190	4	Wauk.	4-4 1/2 x 5 1/2	G,K	3
Case.....	22-40	2550	4	Own	4-5 1/2 x 6 1/2	G or K	4-5	MerryGar.....1922	2	210	2	Evin	1-2 3/4 x 2 1/2	Gas.	.....	Wallis.....K	15-25	1995	4	Own	4-4 1/2 x 5 1/2	G,K	3
Case.....40-72	40-72	5200	4	Own	7 x 8	G,K,D	8-10	Minne.....All-P	12-25	900	4	Own	4-4 1/2 x 7	G or K	3	Waterloo.....N	12-25	675	4	Own	2-6 1/2 x 7	Ker.	3
Caterpillar.....5T	25	.....	2	Own	4-4 1/2 x 6	Gas.	4	Minne.....Gen.P	17-30	1675	4	Own	4-4 1/2 x 7	G or K	3-4	Wetmore.....21-22	12-25	1185	4	Wauk.	4-4 x 5 1/2	G,K	3
Caterpillar.....10T	40	.....	2	Own	4-6 1/2 x 7	Gas.	6	Minne.....	22-41	3000	4	Own	4-6 x 7	G or K	5-6	Whitney.....D	9-18	595	4	Own	2-5 1/2 x 6 1/2	Gas.	2
Caterpillar.....T35	15-25	.....	2	Own	4-4 x 5 1/2	Gas.	3	Minne.....Med.Duty	22-41	3000	4	Own	4-6 x 7	G or K	5-6	Wichita.....T	15-30	2000	4	Beav.	4-4 1/2 x 6	G,K,D	3-4
Centaur.....	5-2 1/2	345	2	N.Way	2-4 1/2 x 4 1/2	G or K	1	Minne.....Heavy Duty	35-70	4150	4	Own	4-7 1/2 x 9	G or K	8-9	Wisconsin.....E	16-30	1850	4	Clim.	4-5 x 6 1/2	G or K	3
Cietrac.....40	40	2500	4	Own	4-4 1/2 x 6	Gas.	4	Mohawk.....1922	8-16	680	2	Light	4-3 1/2 x 4 1/2	G or K	1-2	Wisconsin.....F	20-40	2050	4	Wauk.	4-5 x 6 1/2	G or K	4
Cietrac.....F	9-16	595	2	Own	4-3 1/2 x 4 1/2	G,K,D	2	Moline Univ D	9-18	.....	2	Own	4-3 1/2 x 5	Gas.	2-3	Wisconsin.....H	22-40	2550	4	Clim.	4-5 1/2 x 7	G or K	4-6
Cietrac.....W	12-20	1345	2	Own	4-4 x 5 1/2	G,K,D	2-3	Moline Orch.	9-18	.....	2	Own	4-3 1/2 x 5	Gas.	2-3	Yuba.....12-20	12-20	2400	2	Wisc.	4-4 1/2 x 6 1/2	G,K,D	3
Dakota.....4	15-27	1500	3	Dom.	4-4 1/2 x 6	Gas.	3	Motor Macult.	1 1/2	195	2	Own	1-2 3/4 x 3 1/2	Gas.	.....	Yuba.....15-25	15-25	2750	2	Wisc.	4-4 1/2 x 6	G,K,D	3
Depue.....4	20-30	2500	4	Buda	4-4 1/2 x 6	Gas.	3	NB.....I	3-6	425	4	Own	2-3 1/2 x 4	Gas.	1	Yuba.....20-35	20-35	3900	2	Wisc.	4-5 1/2 x 7	G,K,D	4
Dell.....D	20	2380	4	Cont.	4-4 1/2 x 5 1/2	Gas.	3	Nichols-Shop.....23-42	20-42	2650	4	Own	8 x 10	G or K	3-6	Yuba.....25-40	25-40	4250	2	Wisc.	4-5 1/2 x 7	G,K,D	4
Dell.....H.W.	20	2980	4	Midw.	4-4 1/2 x 6	Gas.	3	Nichols Shop.....	20-42	2650	4	Own	8 x 10	G or K	3-6	Zelle.....	12-25	.....	4	Buda	4-4 1/2 x 5 1/2	G or K	3
Deidt-Alli.....A	3-6	495	..	Own	1-4 1/2 x 5	Gas.	1	Nelson Senor.....	25-50	3000	4	Own	9 x 12	G or K	4-7								
Eagle.....F	12-22	.....	4	Own	2-7 x 8	G or K	3-4	Nelson Senor.....	25-50	3000	4	Wauk.	4-5 x 6 1/2	G,K	4								
Eagle.....H	16-30	.....	4	Own	2-8 x 8	G or K	4-5	Oil Pull.....K	12-20	.....	4	Own	2-6 x 8	K,D	3								
E-B.....AA	12-20	1095	4	Own	4-4 1/2 x 5	G,K,D	3	Oil Pull.....H	16-30	.....	4	Own	2-7 x 8 1/2	K,D	3								
E-B.....Q	12-20	750	4	Own	4-4 1/2 x 5	G,K,D	3	Oil Pull.....G	20-40	.....	4	Own	2-8 x 10	K,D	5-6								
E-B.....	16-32	1750	4	Own	4-5 1/2 x 7	G,K,D	4	Oil Pull.....E	30-60	.....	4	Own	2-10x12	K,D	8-10								
Fagool.....D	9-18	1525	4	Iye.	4-3 1/2 x 5	Gas.	2	Oldsmar Gar.K	2 1/2	525	4	Own	1-5 1/2 x 5 1/2	Gas.	1								
Farm Horse..B	18-30	1885	4	Clim.	4-5 x 6 1/2	G,K	3	Oshkosh.....M	6-12	650	2	Own	2-4 x 6	G,K	1								
Farquhar.....	15-25	.....	4	Buda	4-4 1/2 x 6	G,K,D	3-4	Oshkosh.....G	12-24	985	2	Own	2-6 x 7	G,K	3								
Farquhar.....	18-35	.....	4	Own	4-6 x 8	G,K,D	4-5	Oil Pull.....K	12-20	.....	4	Own	2-6 x 8	K,D	3								
Farquhar.....	25-50	.....	4	Own	4-7 x 8	G,K,D	6-7	Oil Pull.....H	16-30	.....	4	Own	2-7 x 8 1/2	K,D	3								
Pitch.....4 Drive	20-35	1850	4	Clim.	4-5 x 6 1/2	G or K	3-4	Oil Pull.....G	20-40	.....	4	Own	2-8 x 10	K,D	5-6								
Fordson.....	-19	395	4	Own	4-4 x 5	G,K	2	Oil Pull.....E	30-60	.....	4	Own	2-10x12	K,D	8-10						</		

STANDARDIZED SERVICE

has big appeal



THE Marmon advertisements *every week* in The Saturday Evening Post herald a new day for motor car owners, and cause nation-wide discussion of lower maintenance costs. Thousands are writing for "Modern Transportation Costs," which describes Standardized Service. Have you sent for a copy yet? If not, merely drop us a post-card, and a copy will be sent, free. Every dealer should be acquainted with this new offer, for it forecasts the trend of the whole industry.

NORDYKE & MARMON COMPANY

Established 1851

INDIANAPOLIS

MARMON

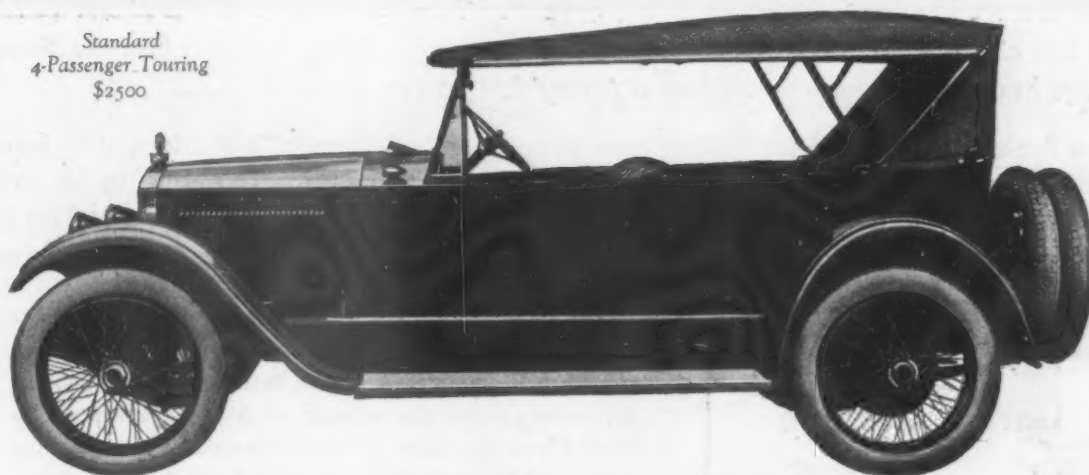
The Foremost Fine Car

Specifications of Current Passenger Car Models

NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan	NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Ace.....	F-G-B	4-3 1/2x5	114	32x4	\$1295	\$1295	.....	.....	\$2295	Lincoln.....	Own.	8-3 1/2x5	130	33x5	\$3800	\$3800	\$3300	\$3900	\$4200
Ace.....	L-H-S	6-3 1/2x5 1/2	117	32x4	2260	2260	.....	.....	3680	Locomobile.....	Own.	6-4 1/2x5 1/2	142	35x5	.....	b7600	7900	10500	11000
Ace.....	C Cont.	6-3 3/8x5 1/4	123	33x4 1/2	2975	2975	.....	.....	4500	Maibahn.....	Own.	6-3 1/2x4 1/2	116	32x4	1395	1395	b1495	2165	2165
Ambassador.....	R Cont.	6-3 3/8x5 1/4	136	33x5	b1590	\$4500	.....	.....	6500	Marmen.....	Own.	6-3 1/2x5 1/2	136	32x4 1/2	3385	b31.5	3185	3585	4385
American.....	C H-S.	6-3 1/2x5	127	33x4 1/2	b1995	1850	1925	.....	2695	Maxwell.....	Own.	4-3 3/8x4 1/2	109	31x4	855	855	.....	1365	1485
Anderson.....	Series 40	Cont.	6-3 1/2x4 1/2	120	33x4	2195	1650	1795	\$2450	McFarlan.....	1922	Own.	6-4 1/2x6	140	33x5	6300	b6300	6300	7500
Apperson.....	8-21-S	Own.	8-3 1/2x5	130	34x4 1/2	.....	2620	2645	3625	Mercer.....	Series 5	Cont.	4-3 3/8x6 1/2	132	32x4 1/2	3950	b3950	a3950	4850
Auburn.....	6-51	Cont.	6-3 1/2x4 1/2	121	32x4	1575	1575	1615	2395	Mitchell.....	Series 5	Cont.	6-3 1/2x4 1/2	119	32x4	1895	1895	.....	.....
Bell.....	4-32	H-S.	4-3 1/2x5	114	31x4	1195	1195	.....	.....	Mitchell.....	F-50	Own.	6-3 1/2x5	120	33x4	c1490	1490	b1690	2050
Bell.....	6-50	H-S.	6-3 1/2x5	124	32x4	1545	1545	.....	.....	Moore.....	1922-S-9	Own.	6-3 1/2x5	127	32x4 1/2	.....	1090	.....	.....
Biddle.....	B1 & B5	Buda.	4-4 1/2x5 1/2	121	32x4	2950	b2950	.....	3950	Moore.....	1922-S-9	Own.	6-3 1/2x5	115	31x4	.....	1965	.....	.....
Brewster.....	91	Own.	4-4 1/2x5 1/2	125	32x4 1/2	5000	5000	.....	7000	Moore.....	6-48	Cont.	6-3 1/2x4 1/2	122	32x4	1785	1785	2285	2785
Buick.....	1922-34-35-36-37	Own.	4-3 3/8x4 1/2	109	31x4	895	935	.....	1295	Nash.....	601-96-97	Own.	6-3 1/2x5	121	33x4	1360	1390	b1540	.....
Buick.....	1922-44-5-6-7	Own.	6-3 3/8x4 1/2	118	33x4 1/2	1365	1395	.....	1885	Nash.....	602-94-95	Own.	6-3 1/2x5	127	34x4 1/2	.....	1540	2090	2390
Buick.....	1922-48-9-50	Own.	6-3 3/8x4 1/2	124	34x4 1/2	n1785	n1785	1585	2075	Nash Four.....	41-4	Own.	4-3 3/8x5	112	33x4	965	985	.....	1295k
Cadillac.....	61	Own.	8-3 1/2x5 1/2	132	33x5	3100	3150	3150	d3875	National.....	BB	Own.	6-3 1/2x5 1/2	130	32x4 1/2	2750	b2750	2750	3900
Case.....	X Cont.	6-3 1/2x4 1/2	122	32x4 1/2	.....	1890	.....	.....	3790	Noma.....	3C	Bea.	6-3 1/2x4 1/2	128	32x4 1/2	2000	b2100	a2200	3200
Case.....	V Cont.	6-3 3/8x5 1/4	126	34x4 1/2	.....	1935	2585	2990	.....	Noma.....	ID	Cont.	6-3 1/2x5 1/2	128	32x4 1/2	3000	b3100	a3200	5500
Chalmers.....	1922	Own.	6-3 1/2x4 1/2	122	32x4	1345	1395	1495	d1995	Norwalk.....	439-K	Lyc.	4-3 1/2x5	116	32x3 1/2	.....	1035	.....	.....
Chalmers.....	1922	Own.	6-3 1/2x4 1/2	122	32x4	.....	.....	.....	.....	Oakland.....	6-44	Own.	6-2 1/2x4 1/2	115	32x4	1120	1145	b1265	1685
Champion.....	Tourist	Lyc.	4-3 1/2x5	113	32x3 1/2	b995	995	.....	.....	Ogden.....	6-T De Luxe	Cont.	6-3 3/8x5 1/2	134	33x5	b3750	3750	3850	4600
Champion.....	Special	H-S.	4-3 1/2x5	118	32x4	b1095	1095	.....	.....	Oldsmobile.....	43-A	Own.	4-3 1/2x5 1/2	115	32x4	b1445	1445	1450	1795
Chandler.....	Sta	Own.	6-3 1/2x5	123	33x4	1595	1595	1695	2295	Oldsmobile.....	46	Own.	8-3 1/2x4 1/2	122	33x4 1/2	b1735	1735	.....	2635
Chevrolet.....	490	Own.	4-3 1/2x4	102	30x3 1/2	525	525	.....	875	Oldsmobile.....	47	Own.	8-3 1/2x4 1/2	115	32x4	b1595	b1595	2145	2295
Chevrolet.....	FB	Own.	4-3 1/2x5 1/4	110	32x4	975	975	.....	1575	Overland.....	4	Own.	4-3 3/8x4	100	30x3 1/2	550	550	.....	895
Cleveland.....	41	Own.	6-3 1/2x4 1/2	112	32x4	1175	1195	.....	1595	Packard.....	Single-Six	Own.	6-3 3/8x5	126	33x4 1/2	2485	2485	a2250	3175
Cole.....	890	North.	8-3 1/2x5 1/2	127 1/2	33x5	2485	b2485	2485	3185	Packard.....	Single-Six	Own.	6-3 3/8x5	133	33x4 1/2	.....	2350	2685	3525
Columbia.....	Challenger	Rut.	6-3 1/2x5	115	32x4	1195	1195	.....	1595	Packard.....	Twin Six	Own.	12-3 1/2x5	136	35x5	3850	3850	5240	5400
Columbia.....	D-C&CS	Cont.	6-3 1/2x4 1/2	115	32x4	1475	1475	b1475	b2295	Paige.....	6-44	Own.	6-3 1/2x5	119	32x4	1465	1465	1995	2245
Columbia.....	Light Six	Cont.	6-3 1/2x4 1/2	115	31x4	985	985	.....	1295	Paterson.....	6-66	Cont.	6-3 1/2x5	131	33x4 1/2	b2245	c2495	2195	3100
Comet.....	C-53	Cont.	6-3 1/2x5 1/4	125	33x4 1/2	.....	1085	2085	2935	Pearless.....	56-S-7	Own.	6-3 1/2x4 1/2	120	32x4 1/2	.....	1550	1585	2595
Crawford.....	22-6-60	Cont.	6-3 1/2x5 1/4	122 1/2	32x4	3000	3000	3000	4500	Pearless.....	56-S-7	Own.	8-3 1/2x5	125	34x4 1/2	.....	2790	2790	3790
Daniels.....	D-19	Own.	8-3 1/2x5 1/4	432	34x4 1/2	c4350	b4350	4350	5950	Pierce-Arrow.....	Own.	6-4 1/2x5	138	33x5	7000	b6500	6500	8000	
Davis.....	71	Cont.	6-3 3/8x4 1/2	114	31x4	.....	1195	.....	.....	Pilot.....	6-45	Teeter	6-3 1/2x5	120	32x4	b1500	1500	.....	.....
Dixie Flyer.....	H-S-70	H-S.	4-3 1/2x5	112	32x4	1175	b1295	1545	1595	Pilot.....	6-50	H-S.	6-3 1/2x5	126	32x4 1/2	2050	2000	2050	3000
Dodge Brothers.....	Own.	4-3 3/8x4 1/2	114	32x4	880	880	.....	1280	1440	Premier.....	6-D	Own.	6-3 1/2x5 1/2	126 1/2	33x5	3150	b3100	3250	4300
Dorris.....	6-80	Own.	6-4 1/2x5	132	33x5	.....	b1785	4785	5800	R & V Knight.....	R	Own.	4-3 3/8x5	116	32x4	.....	1665	.....	2385
Dort.....	19-14	D-Ly.	4-3 1/2x5	108	31x4	885	885	.....	1315	R & V Knight.....	R	Own.	6-3 3/8x5 1/2	127	32x4 1/2	2475	b2475	2475	3015
Driggs.....	Own.	4-2 1/2x4 1/2	104	30x3 1/2	1275	1275	.....	1975	.....	Reo Series.....	B-T & U6	Own.	6-3 1/2x5	120	33x4	1595	.....	1595	2355
Duesenberg.....	Straight 8	Own.	8-2 1/2x5	134	33x5	6500	6500	6750	7800	ReVer.....	C Dues.	Own.	4-4 1/2x6	131	32x4 1/2	3200	3200	3200	4000
Du Pont.....	A	Own.	4-3 1/2x5 1/4	124	32x4 1/2	3090	3200	.....	3800	Rickenbacker.....	A	Own.	6-3 1/2x4 1/2	117	32x4	.....	1485	.....	1885
Durant.....	A-22	Cont.	4-3 3/8x4 1/2	106	31x4	n890	890	.....	1365	Roamer.....	6-54-E	Cont.	6-3 1/2x5 1/2	128	32x4 1/2	2850	b2555	2785	3850
Durant.....	B-22	Anst.	6-3 1/2x4 1/2	123	32x4 1/2	1690	1650	.....	2250	Roamer.....	4-75-E	Dues.	4-4 1/2x6	128	32x4 1/2	3985	b3585	b3750m	b1650
Earl.....	40	Own.	4-3 1/2x5 1/4	112	32x4	1485	995	.....	1695	Rolls-Royce.....	Own.	6-4 1/2x5 1/2	143 1/2	33x5	.....	10,900	.....	.....
Ecar.....	K-4	Lyc.	6-3 1/2x5	118	33x4	1095	n1095	1345	.....	Saxon.....	125	Own.	4-3 1/2x5	112	32x4	1195	1195	.....	1795
Elgin.....	K-1	Own.	6-3 1/2x4 1/2	118	33x4	1395	1395	n1395	2065	Sayer Six.....	DP	Cont.	6-3 1/2x4 1/2	118	33x4	1695	1695	.....	2795
Essex.....	Own.	4-3 3/8x5	108 1/2	32x4	.....	1095	.....	1295	1895	Seneca.....	L-2 & O-2	Lyc.	4-3 1/2x5	108	30x3 1/2	875	875	.....	.....
Ford.....	T	Own.	4-3 1/2x4	109	30x3 1/2	r319	c348	u285	580	Seneca.....	50 & 51	Lyc.	4-3 1/2x5	112	31x4	1095	1095	.....	.....
Franklin.....	9-B	Own.	6-3 1/2x4	115	32x4	1900	1950	u1750	2750	Sporting.....	A Supr.	Own.	4-3 1/2x5	114	32x4	980	980	.....	1685
Gardner.....	T-R & G	Lyc.	4-3 1/2x5	112	32x4	895	895	.....	1595	Standard.....	Starling	Own.	8-3 1/2x5	127	34x4 1/2	2500	b2500	2500	3200
Goodspeed.....	Own.	4-3 3/8x5 1/2	124	32x4 1/2	3935	3785	.....	.....	.....	Stanley.....	Own.	2-4 1/2x5	130	34x4 1/2	2800	2000	2000	3775	
Grant.....	Own.	6-3 3/8x4 1/2	116	32x4	1385	1385	.....	1895	1945	Starwood Six.....	Cont.	6-3 1/2x4 1/2	118	33x4	1765	1765	.....	2750	
Gray.....	Own.	4-3 3/8x4	100	30x3 1/2	.....	490	.....	.....	760	Star.....	Cont.	4-3 1/2x4 1/2	102	30x3 1/2	c319	a348	u285	580	
H.C.S.....	Series 3	Weid.	4-3 3/8x5 1/2	120	32x4 1/2	2400	2400	.....	2850	Stearns Knight.....	SKL4	Own.	4-3 1/2x5 1/2	125	34x4 1/2	2250	2250	2450	3450
Halladay.....	4	Own.	4-3 1/2x5	115	32x4	1095	1095	.....	1990	Stevens.....	90	Own.	6-3 1/2x4 1/2	122	33x4 1/2	1575	b1595	a1625	2450
Halladay.....	6	Own.	6-3 1/2x5	115	32x4	1595	1595	.....	2295	Stevens-Duryea.....	E	Own.	6-4 1/2x5 1/2	138	35x5	7250	b6000	6800	u5600
Handley-Knight.....	Own.	4-4 1/2x4 1/2	125	32x4 1/2	.....	2650	3450	3450	.....	Studebaker.....	Light Six	Own.	6-3 1/2x4 1/2	112	32x4	1045	1045	.....	1375
Hanson.....	30	Cont.	6-3 1/2x4 1/2	112	31x4	.....	995	.....	.....	Studebaker.....	Special Six	Own.	6-3 1/2x5	119	32x4	1425	1475	b1475	2150
Hanson Six.....	60	Cont.	6-3 1/2x4 1/2	121	32x4	1595	1595	1795	b2475	Studebaker.....	Big Six	Own.	6-3 1/2x5	126	33x4 1/2	.....	n1985	1785	2500
Hatfield.....	A-42	H-S.	4-3 1/2x5	115	32x4	b1315	1345	.....	1950	Stutz.....	Own.	4-4 1/2x6	130	32x4 1/2	2960	b2990	a2990	3990	
Haynes.....	75	Own.	6-3 1/2x5 1/2	132	34x4 1/2	2395	b2395	2395	3395	Templar.....	A-445	Own.	4-3 1/2x5 1/2	118	32x4	2025	2125	b2175	2785
Haynes.....	55	Own.	6-3 1/2x5	121	33x4	1645	1595	.....	2295	Telen.....	E-1-2-3	H-S.	4-3 1/2x5	117	33x4	1175	1175	.....	.....
Haynes.....	48	Own.	12-2 1/2x5	132	34x4 1/2	2895	3595	2895	3805	Valie.....	48	Cont.	6-3 1/2x4 1/2	115	32x4	1585	1585	b1800	2485
Holmes.....	Series 4	Own.	6-3 1/2x4 1/2	126	34x4 1/2	b2500	.....	2500	b3300	Valie.....	34	Own.	6-3 1/2x4 1/2	112	32x3 1/2	1235	1235	.....	1750
Hudson.....	Super	Own.	6-3 1/2x5	126	34x4 1/2	b1695	.....	1745	2570	Valie.....	58	Own.							

Y O U R S T O C O M M A N D

Standard
4-Passenger Touring
\$2500



Unlimited resources and manufacturing facilities, cars of exceptional merit and fine appearance—

These, combined with forceful advertising, give particular value to the Standard franchise.

It is our desire to make permanent alliances with dealers who have vision.

New catalogue is now ready.

THE STANDARD MOTOR CAR COMPANY
Pittsburgh, Pa.

STANDARD EIGHT

The Car With Airplane Lubrication

More Power and
Gasoline Mileage



Over 500 Miles to
Each Quart of Oil

Collect Storage Profits

GET full charges for all cars left with you for storage. With Comfort Garage Storage Tags in daily use you cannot lose a penny due you on storage.

Study the fac-simile shown here. Note how simply and adequately it is adapted to storage problems—how it assures collections. It leaves no chance for an automobile to be driven from your garage without every cent due for service in your cash box or charged on your books. These tags also record charges other than storage, due from service or supply sales.

FORM 15 To be Tied on Car		Number B670	
Garage Storage			
Name <i>Thomas White</i>			
MAKE OF CAR <i>Dodge</i>		LICENSE NO. <i>44114 Mo.</i>	
MOTOR NO. <i>486942</i>		DATE LEFT <i>June 3</i> A. M.	
CHARGES			
Storage 1 Days @		<i>50</i>	
Gasoline 5 Gals. @ <i>74¢</i>		<i>1 70</i>	
Oil Qts. @		<i>60</i>	
Washes		<i>1 50</i>	
CHARGES ON			
Repair Ticket No. <i>692</i>		<i>7 57</i>	
Charges on Tire Tag No. <i>455</i>		<i>1 50</i>	
Date Called for			
A. M. <i>June 4</i>			
Total Charges		<i>7 92</i>	
Present this Check when calling for Car.			
Claim Check No. B 670			
ALL CHARGES C. O. D.			
Not Responsible for Loss by Fire or Theft			
<small>COMFORT PRINTING SPECIALTY CO. ST. LOUIS, MO. ALL RIGHTS RESERVED</small>			

Actual size of Tag is 2 3/4 x 5 1/4 inches.

Form 15 is a simple, profit-protecting tag to be attached to the car. The claim check goes to the customer. It identifies him when he calls for the car. As the tag states the amount of charges and must be turned into the office, it leaves no chance for unscrupulous employees or others to pocket the cash.

Prices, F. O. B. Your City

100 \$0.75	1,000 \$ 3.00
250 1.50	2,500 7.00
500 2.00	5,000 13.50

Printing name and address on claim check \$1.50 per thousand extra. If less than one thousand are ordered this printing charge will be \$1.50. For strings and wires for these tags, see catalog.

For those who may desire an additional office check on storage we supply Garage Storage Tag, Form 16. Sample on request.

*Write for our free book, bound in cloth,
"Making and Saving Profits"*

Comfort Printing Specialty Co.
101 North Eighth Street, Saint Louis, Mo.

COMFORT PRINTING SPECIALTY CO.
101 N. Eighth St., St. Louis

Please ship us Comfort Garage Storage Tags, Form 15.

Price \$.....

If name is to be imprinted add amount here

Please find check enclosed for Total

Name

Address

City State

If imprinting of name is ordered also, send this additional coupon.
Print out fully and plainly the exact wording desired.

Name

Address

City State

HYDRO-TORON SS TIRES SS

*Guaranteed 10,000 Miles Against Stone-Bruise, Rim-Cut,
Blow-Out*

PRICES REDUCED!

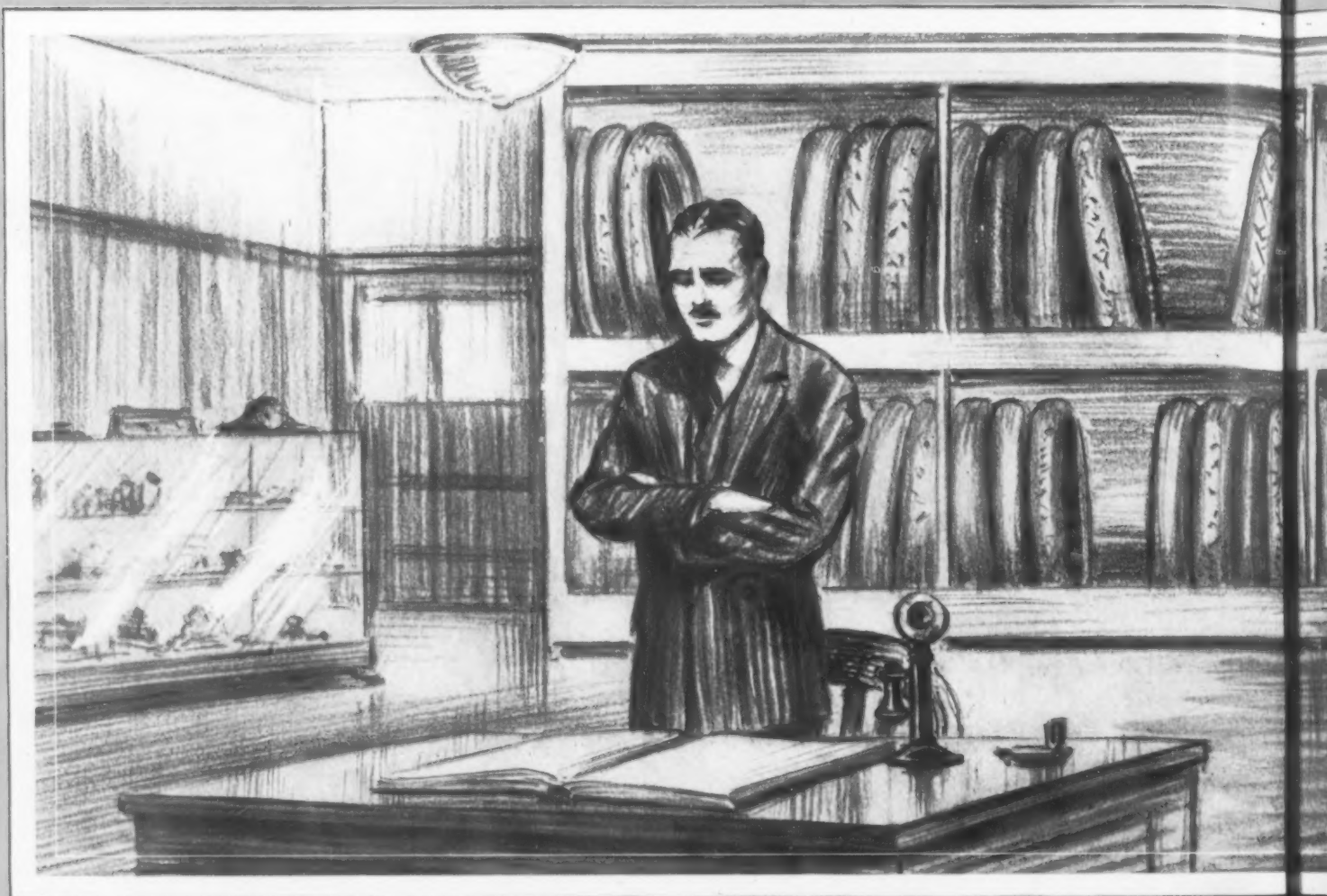
20% on Ford
Clincher Sizes

10% on all Straight
Side Sizes

Effective May 15, 1922

These sweeping price reductions make Hydro-Toron Tires—always “Bigger than Cords, better than Cords”—now actually lower in price than many standard fabric tires.

The facts about the Hydro-Toron proposition are of immediate interest to every Dealer who wants to put his tire business on a paying basis.



Business Success is not a Gift

*—It is a matter of meeting
the conditions of the market*

HYDRO-TORON is the tire that came through the business depression with a record of sales growth that no tire had ever before approached, even in the peak days of the industry.

For here is a tire as big and husky and resilient as a cord, with a specific guarantee that no cord is able to make, available to motorists at prices they can afford to pay.

Dealers who handled the Hydro-Toron sold more tires than they had ever sold before—though all other tire business was at a standstill.

And now with prices that average lower than many standard fabrics, and with the upward swing well under way, they are set for a record that will dwarf all achievements of the past.



Photo-Micrograph of ordinary Tire Fabric showing incomplete impregnation of fabric with rubber

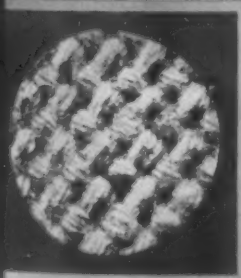
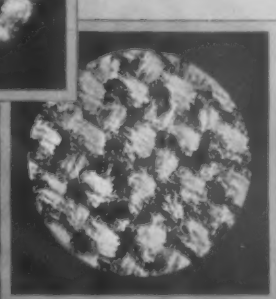


Photo-Micrograph of Toron Fabric. Rubber and Fabric are almost inseparable



Hydro-United Factories at Pottstown, Pa

HYDRO-TORON tires are made of fabric sealed with Toron chemical treatment. Every strand is armored in rubber so that friction is eliminated. Our process of curing by internal hydraulic expansion prevents the layers from buckling, and the absence of external pressure removes all chance of mold pinch and bead displacement.

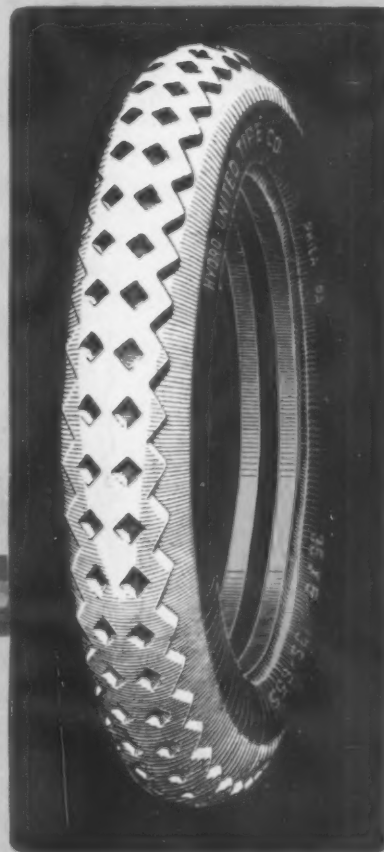
Hydro-Toron Tires are guaranteed for 10,000 miles against stone-bruise, rim-cut and blow-out.

Do you want to enjoy the prosperity that has come to all Hydro-Toron dealers? Do you want the benefits of unstinted selling and advertising co-operation?

Then write at once on your business letterhead for the Hydro-Toron dealer proposition.

HYDRO-UNITED TIRE COMPANY,

Pottstown, Penna.



HYDRO-TORON SS TIRES SS

Guaranteed for 10,000 Miles Against Stone-Bruise, Rim-Cut, Blow-Out

HYDRO-TORON SS TIRES SS

*Guaranteed 10,000 Miles Against Stone-Bruise, Rim-Cut
Blow-Out*

Hydro-Toron is a better business proposition today than it ever was. And it is backed by a co-operative program of local sales and advertising effort that assures profitable results from the start. By all means get the Hydro-Toron story before your territory is signed up. A request on your business letter-head will bring full particulars.

HYDRO-UNITED TIRE COMPANY
POTTSTOWN, PENNA.

Thousands Are Being Sold!

Every tire service man and every mechanic who has occasion to change tires is keen for this new rim wrench idea. They all say it's a winner—one of the handiest tools ever brought out. It handles practically all rim bolt sizes from Ford to giant pneumatic— $\frac{5}{8}$ ", 11-16", $\frac{3}{4}$ " and $\frac{7}{8}$ ". Four sizes all in one wrench ready for instant use. The thousands of orders we have received proves the great popularity of this latest Blackhawk Wrench.

Strong, Durable, Handy—Four Wrenches in One

This wrench is built for heavy duty service. The handle is $\frac{5}{8}$ " steel—the four-size socket head is one piece drop forging. There are no springs or small parts to break or get out of order.

Like all Blackhawk Wrenches this wrench is guaranteed to give perfect service. The list price is \$3.50—good discounts to the trade. When ordering please mention your jobber's name.

Jobbers—Write for details.

Manufactured by

**American Grinder Mfg.
Company**

Milwaukee, Wis.

Exclusive Sales Representatives
C. N. and F. W. Jonas

Chicago	Seattle
Los Angeles	Atlanta
San Francisco	New York



To Change Socket Size

Simply turn the socket head to the required size. A ball socket holds this size from slipping when the wrench is taken off a nut.

BLACKHAWK

4 in 1 Universal Rim Wrench



2 Thousand Service Stations

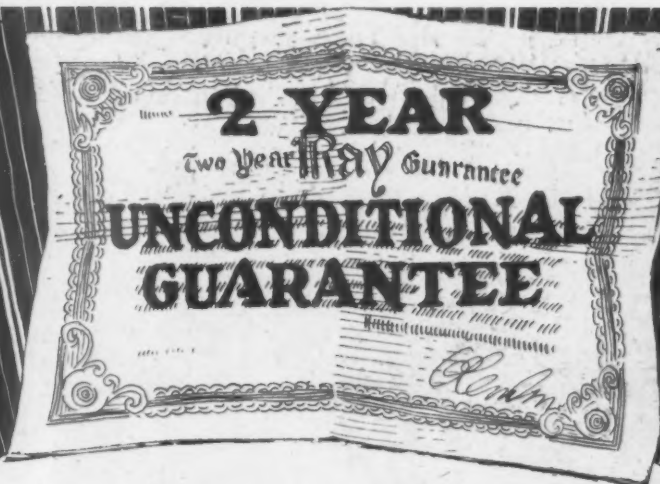
Two years ago the **Ray** Battery started without fame, recognition or distribution. Today there are two thousand service stations selling the **Ray**.

Actual value to the user, dependable battery service, and the 2 year Unconditional Guarantee have made the **Ray** the most popular battery with **Ray** users and dealers.

Ray Battery dealers claim the largest profits from sales. There is still valuable territory open. Ask about it.

Ray Battery Company
21 North Huron St.
Ypsilanti, Michigan

RAY



2 Year Unconditional Guarantee

With this guarantee the user is assured uninterrupted service—starting, lights and ignition for two years, at the price of one battery. The **Ray** dealer is assured the full profit from every **Ray** sale—no time lost in compulsory inspections or arguments.

The dependable **Ray** Battery means satisfied customers—satisfied customers means successful dealers.

Ray territories are not assigned carelessly, certain qualifications are necessary to become **Ray** Dealers. Your territory may still be open, you may be the man to control it. Find out. Address

Ray Battery Company
21 North Huron St.
Ypsilanti, Michigan

RAY



Goes Where It Ought To Go — Tells What You Ought To Know

The **Borg & Beck Heat Indicator** is a theft-proof, scientific instrument—installed on the dash—which records correctly, the *true temperature* existing at the motor, at all times, and its accuracy is not affected by cold winds, rain, snow or other conditions. It warns of motor “overheating” before the danger point is reached, tells when the motor is “too cold” for efficient operation, and shows, at a glance, the true condition of the motor, by day and at night—even in rain, fog, sleet or snow—always accurate under all conditions.

Borg & Beck Heat Indicator

The silver plated, etched metal Dial is installed on the instrument board, where it is always visible, and easily read by day or night. The temperature ranges are of contrasting colors, and the large white pointer shows, at a glance, the true condition and efficiency of the motor. A flexible shaft in protective housing mechanically operates the indicating hand.

Easily Installed by Any Mechanic

It fits all motors—one model only.

It will not break or get out of order.

Our Universal Clamp for attaching the Actuating Unit to the motor, makes the installation a very simple one.

It tells the True Motor Temperature, and not merely the temperature of the radiator or some remote part of the water circulating system.

It is “theft-proof” and requires no locking device.

It has no electrical connections or complicated parts. Installed permanently in an hour or less—requires no oiling or subsequent “tinkering.”

THE BORG & BECK COMPANY

916 S. Michigan Ave., Chicago, Ill.

Manufacturers of the Borg & Beck Clutch. Over 1,250,000 in Use
Factories: Chicago and Moline, Ill.

The Actuating Unit is clamped against the motor and contains a highly sensitive thermostat, of unique design—small in size, but positive in action, and any slight variation in the temperature of the motor causes it to expand or contract automatically, in direct proportion to the degree of heat or cold existing at the motor.

Complete Outfit Only \$8.50

Outfit includes the Dial—Actuating Unit—Universal Clamp and 4 feet of flexible shaft in protective housing which mechanically operates the indicating hand.

DEALER'S COUPON

THE BORG & BECK COMPANY,
916 S. Michigan Ave., Chicago, Illinois

Please send dealer's discounts, instructions for installing and complete information about the Borg & Beck Heat Indicator.

Name

Street

City State

Jobber's Name

The BEST IDEAS in OIL STATION BUILDING

NOW, the individual or oil company contemplating the building of an Oil Station can secure from ONE SOURCE complete PLANS AND SPECIFICATIONS of a modern, up-to-date station exactly suited to their needs and location, ready to turn over to the builder or contractor—

Also the famous and widely used

American Visible Curb Pump

together with the Oil Equipment and everything needed to complete the station ready for operation.

The plans combine the MOST SCIENTIFIC construction with the BEST and MOST ATTRACTIVE designs, including complete details for economical and efficient arrangement of interior fixtures.

We have issued a booklet illustrating a number of designs and explaining how a THOUSAND COMBINATIONS of buildings, interiors and ground plans can be made from our plans.

Ask for Booklet 59-F

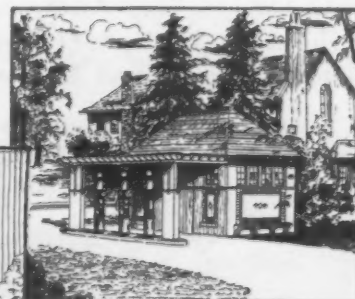
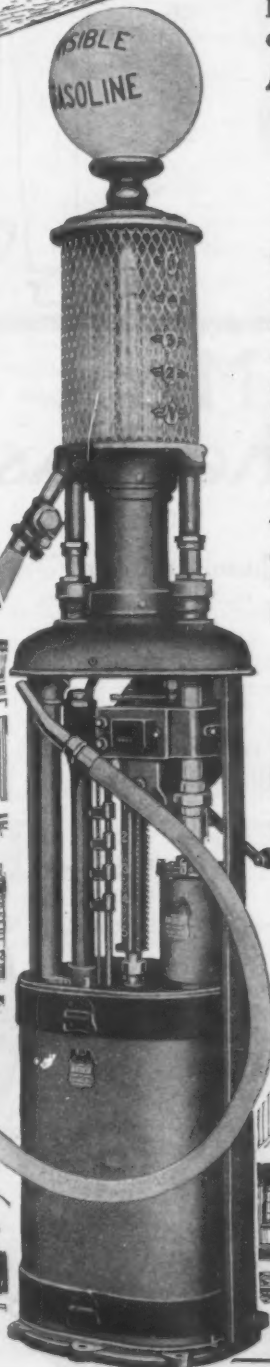
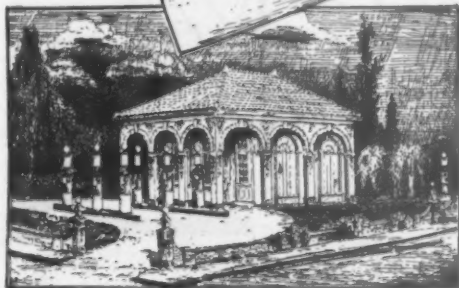
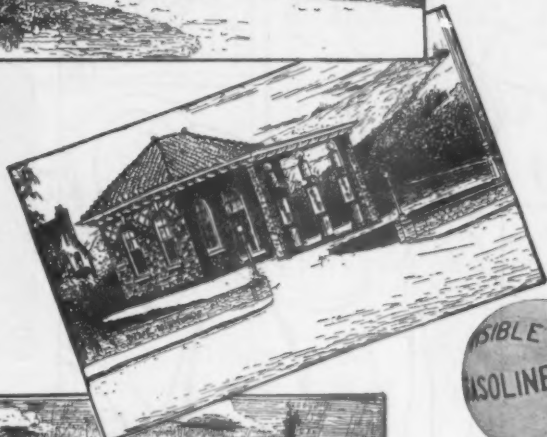
The American Oil Pump *Land Tank Company*

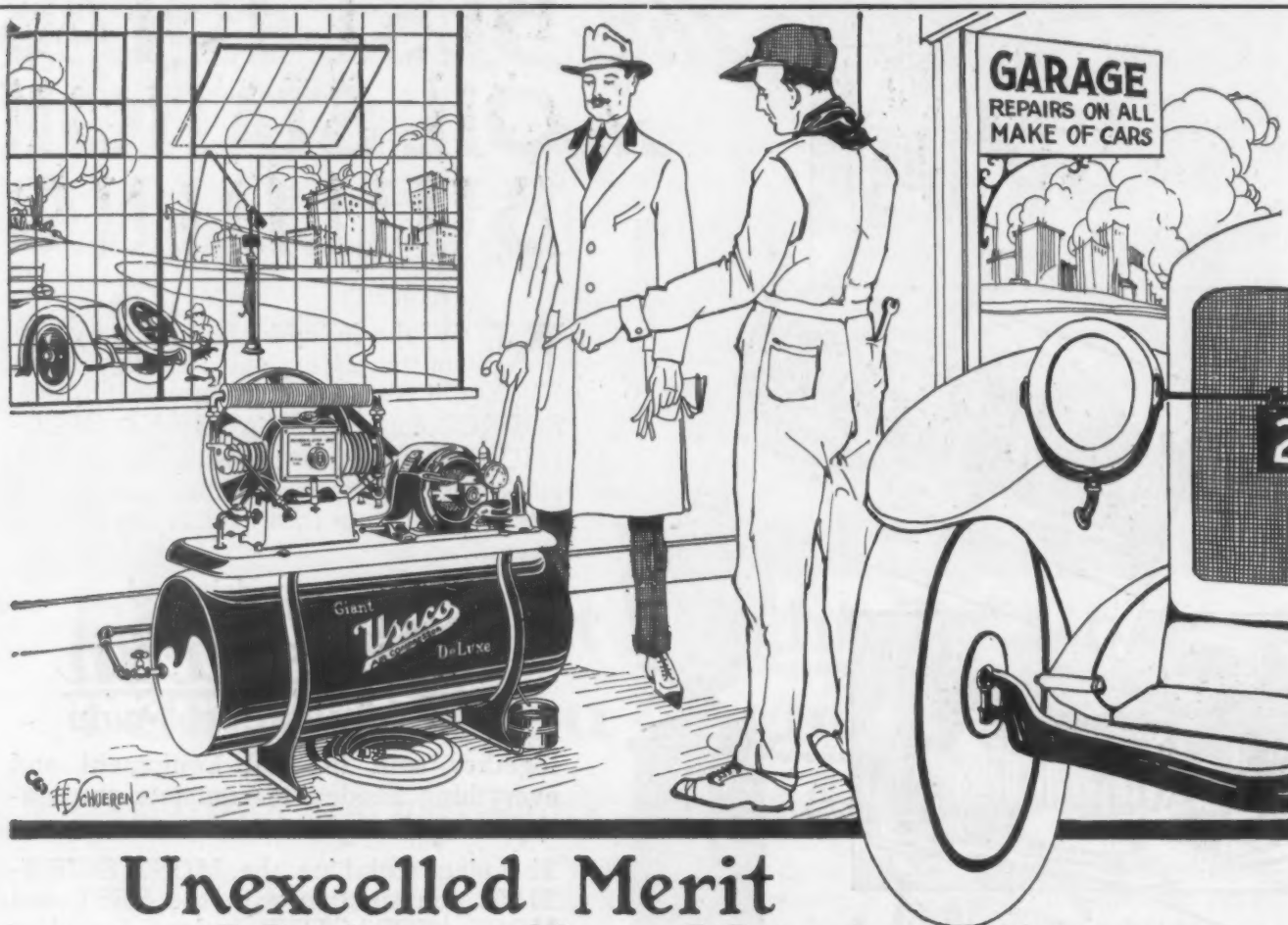
1159 FINDLAY ST.

CINCINNATI, OHIO.

IMPORTANT!

Be sure and specify booklet by number.





Unexcelled Merit Makes the Masterpiece

"It runs as smoothly as a sewing machine, and our customers appreciate its dependable service."

"Yes, your Air Service is one of the things that brings me here so often."

Real merit, born of quality and superiority, cannot be hidden. It stands as firm and prominent as Gibraltar—and what pride there is in making a thing of merit!

Business has an unwritten law that merit and superiority are bargains, and doubly so, when the price is reasonable. This truism has built the largest factory devoted to the manufacture of Two-Stage Air Compressors in the world.

Things of such unapproached merit as Usaco Air Compressors are a joy to all who help produce them, and a constant source of satisfaction to owners, because Usaco units "Beckon Business!"

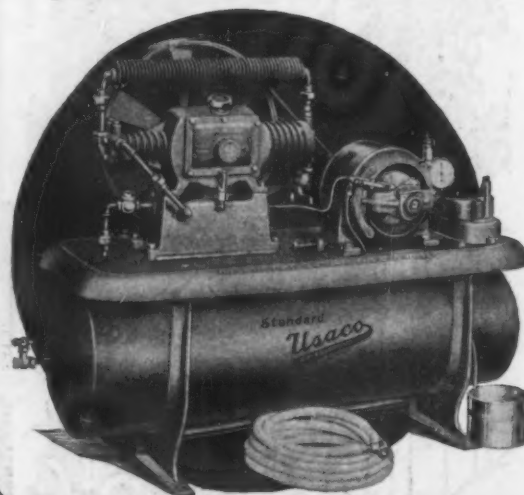
Write for Literature

The United States Air Compressor Co.
5304 Harvard Ave. Cleveland, O.

ASK ABOUT



Usaco
AIR COMPRESSORS
TRADE MARK



Usaco Air Compressors

Beckon Business"

The Two Things You Want

THE first thing is a tire that has proved itself by actual service to be a good tire. And closely associated with this is the thought that the company which makes it must be reliable.

The second thing is the right kind of advertising in your territory to help you sell it.

If you put these two things together, haven't you got an ideal tire proposition? It is the sort of proposition we would look for if we were in your place.

Possibly the name Hanes on a tire is new to you; but the Hanes Cord is not a new tire. The fact is that it is five years old and has behind it five successful years in other territories where it has stood every test.

It is made by the Hanes family of

Winston-Salem, North Carolina, a family whose name has long been a synonym in the South for solidity and reliability in manufacturing.

Once in a territory, we back up our distributor with the kind of advertising which in his experience has demonstrated itself to him to be the best kind of advertising for his particular territory.

Hanes is not a changeable house. It stands solidly by its organization. It is slow to open new territories simply because it is cautious to get the right sort of representation. Once the Hanes franchise in a territory is gone, it will in all likelihood be gone for good. An inquiry will bring a representative to go over our proposition with you. You will find that the price is right just as the quality and cooperation are right.

HANES RUBBER CO.

Winston-Salem,

North Carolina

HANES CORD TIRES

The High Water Mark in Tire-making Skill





*Abolish the
Scraper*



10 Reasons for Using **KWIK-AK-SHUN** (QUICK ACTION)

BEARING-FITTING COMPOUND
FITS BRONZE, BABBITT AND BRASS BEARINGS EQUALLY WELL

1. Saves 10 hours in fitting the bearings of one motor.
2. Saves \$75 for each 3-oz. can used.
3. Produces perfect bearings.
4. Leaves skilled mechanics free to do other work.
5. Makes it unnecessary to "take up" bearing, which must be done soon after scraping.
6. Bearings fitted with KWIK-AK-SHUN run 4 times longer than scraped bearings, without further attention.
7. Builds up business for garage or repairshop by establishing reputation for 100% work.
8. Eliminates costly delay through shut down of machinery for bearing repairs.
9. Saves power consumption in operation of machinery by elimination of friction at bearing, as uniform lubricating clearance around shaft is provided.
10. Because over 8700 other users have found it to be an actual shop necessity.

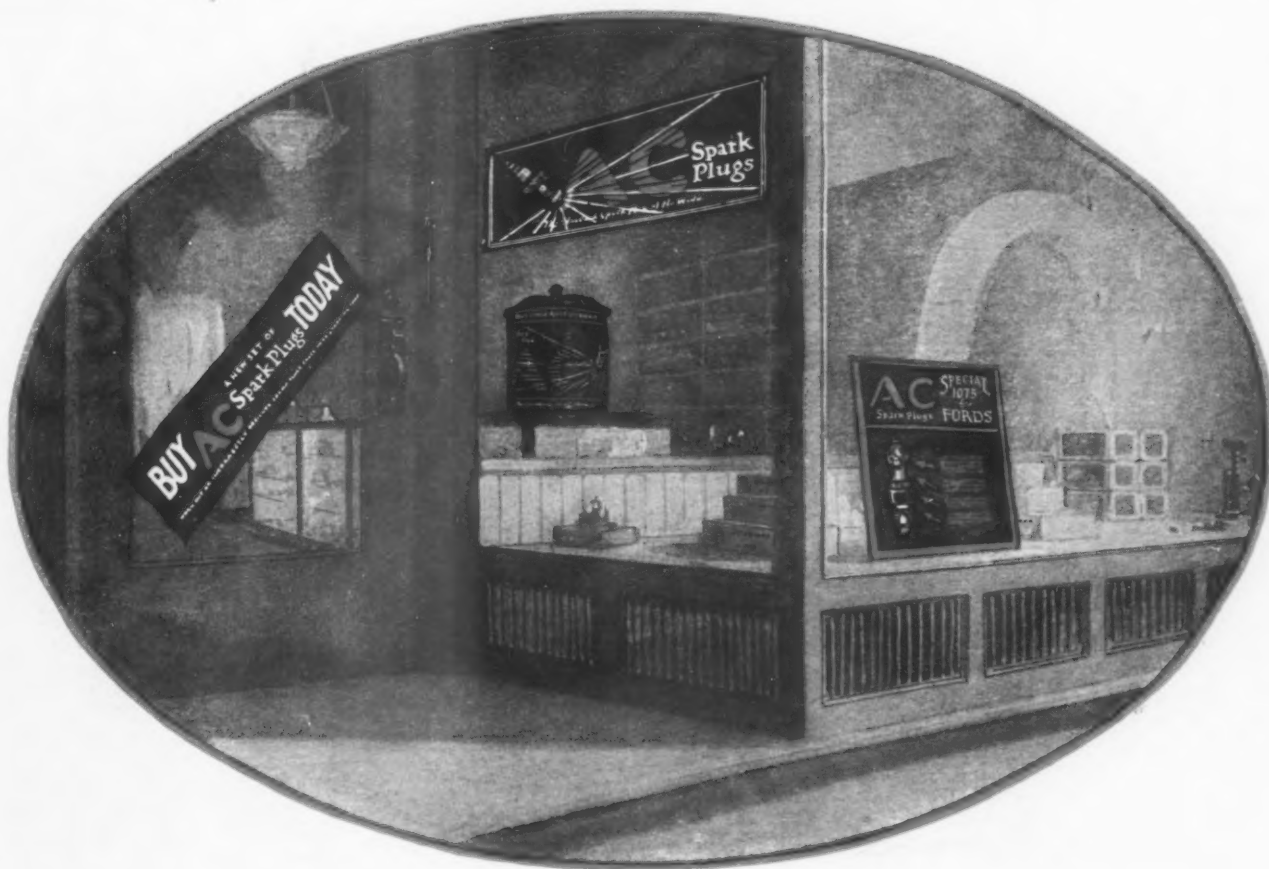
*Single Can—fine or coarse
(net weight 3 oz.) \$1.00
(sufficient to fit bearings of
six 6-cylinder motors).*

Get it for your Shop or your Shelves to-day!

*For sale by leading jobbers.
Full information on request.*

UNITED STATES PRODUCTS COMPANY
Sole Manufacturers
Pittsburgh, Pa.

Sales Division
Edward A. Cassidy Co., Inc.
23 West 43rd Street,
New York City



Why it Pays to Connect Your Store With AC Advertising

When you put the AC sign in your window, the AC Quick Seller on your counter and show the AC 1075 display stand prominently in your store, you are connecting your place of business with AC national advertising and AC reputation.

Year after year we have advertised AC Spark Plugs nationally.

For 14 years car owners have used AC Spark Plugs because most makes of

cars have always been AC-equipped.

The next page shows you why, with an AC Quick Seller and the complete AC Line you can meet all your customers' needs.

Now we have added AC 1075 for Fords; on page three of this insert we show why it is the best plug for Ford engines.

Be sure to read the last page of this insert carefully. It contains sales information of much value to you.



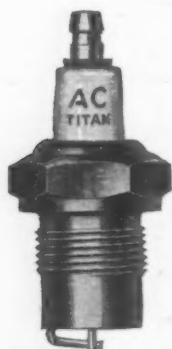
Sell AC Spark Plugs by the Set

Stock These AC's

Each Plug Has Its Own Following of Customers Due to Car Equipment



Regular $\frac{3}{4}$ Titan: Equipment on 170 makes of cars, trucks, tractors, etc., including such prominent manufacturers as Cadillac, Case, Chalmers, Cleveland, Cole, Dort, Hudson up to 1921, Hupmobile, Jewett, Kissel Kar, LaFayette, Liberty, Maxwell, National, Olds 8, Paige-Detroit, Pilot, Westcott, Yellow Cab



Long $\frac{3}{4}$ Titan: Regular equipment on Buick since 1908, on all Chevrolet models, Haynes Model 75, 1920 Kissel Kar, Samson Tractors, Olds Trucks



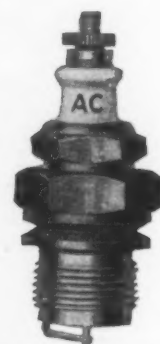
Dodge Titan: Used for regular equipment on every Dodge Brothers car made to date



$\frac{3}{4}$ Long Body Titan: Regular equipment on Chandler, Willys-Knight, Moreland Trucks, Robinson Fire Trucks, Titan Trucks



$\frac{3}{4}$ Extra Long Body Titan: Designed especially for Haynes Model 55; Regular equipment on these cars since 1921



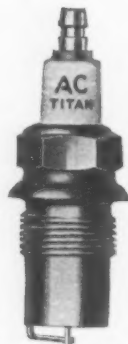
Regular $\frac{3}{4}$ AC two-piece. Regular equipment on the following tractors: Boring, Dart, Lauson, Stockton, Tioga. This two-piece plug is also made in the $\frac{1}{2}$ " Reg., $\frac{1}{2}$ " Long and $\frac{3}{4}$ " Long



SAE Regular: Regular equipment on Apperson, Daniels, Durant 6, Locomobile, Marmon, Mitchell, Saxon, Stearns - Knight, Delco Light, Republic Trucks



Long SAE Titan: Regular equipment on Nash until 1920, Durant 4, Oakland, Oldsmobile 6, Scripps-Booth 6 and Monroe



Extra Long SAE Titan: Regular equipment on Nash 6 since 1920, on Nash 4 and McFarlan



Regular Metric Titan (Carbon-Proof Type): Regular equipment on all Essex cars and on Hudsons since 1921. (Plain Porcelain type) Equipment on Wills Sainte Claire



$\frac{3}{4}$ Regular Carbon Proof: Regular equipment on Overland Four

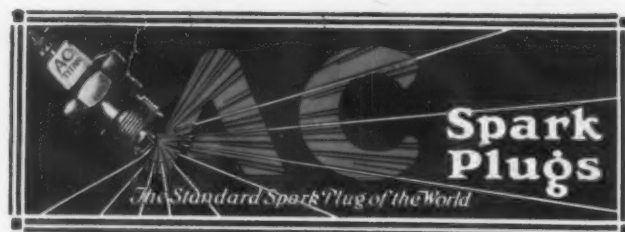


Long $\frac{3}{4}$ Titan: Regular equipment on Reo for eight years

The cars listed beneath the plugs do not include all the engines that use AC's for standard equipment. But these few names show you why you need to stock the complete AC Line. The rest of the AC-equipped motors are shown on the AC equipment chart inside the Quick Seller. With the complete AC Line you are in position to replace worn-out and incorrectly designed plugs in all makes and types of engines.



The AC Quick Seller holds a complete stock of AC Spark Plugs, enabling you to supply instantly the correct plugs for any engine. If you haven't one of these attractive cabinets on your counter, get one at once from your jobbing salesman or write to us direct.

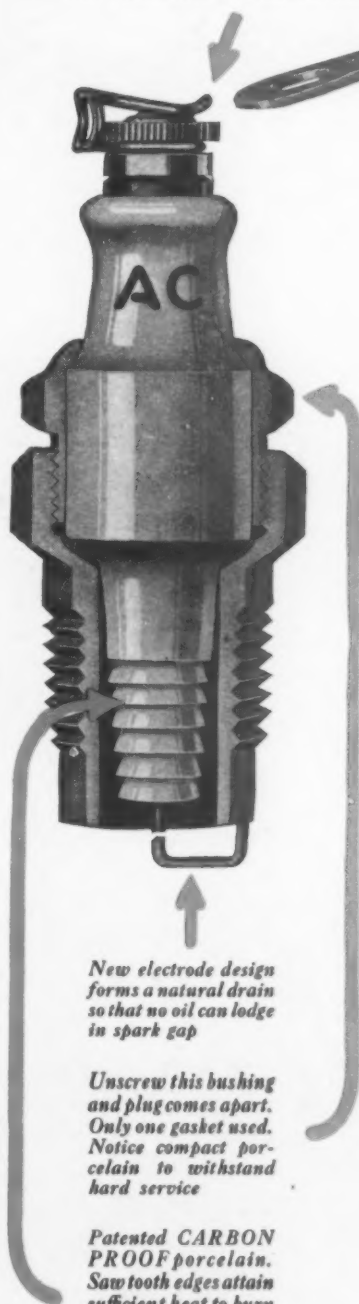


Here is the AC window transparency. It helps connect your store with AC national advertising. Order one at once.

Sell A C Spark Plugs by the Set

Why AC 1075 Has First Place in Your Biggest Market

Spring terminal clip permits wire to be instantly detached and re-connected while motor is running. Facilitates testing spark plug and coil. No nut to be unscrewed or lost



New electrode design forms a natural drain so that no oil can lodge in spark gap

Unscrew this bushing and plug comes apart. Only one gasket used. Notice compact porcelain to withstand hard service

Patented CARBON PROOF porcelain. Sawtooth edges attain sufficient heat to burn oil deposits, thus offering effective resistance to carbon

The market for AC 1075 is the largest in your community because of the large number of Fords in operation and the chance it gives you to sell complete sets of AC 1075's to replace worn-out and incorrectly designed plugs.

You can render a real service to Ford owners by showing them how the AC 1075 is specially designed to eliminate the troubles always experienced with inferior plugs.

With this attractive display and demonstrating stand in your store you can quickly point out the various features that make the AC 1075 the best plug ever provided for Ford engines.



The customer can demonstrate for himself how easy it is to remove and attach the regular Ford terminal, making it possible to test his coil and plug instantly, without stopping the engine. This feature alone is worth the price of the plug.

Call attention to the new design electrode shaped to form a natural oil drain so that the spark gap is kept open.

Point out to Ford owners the knife-edge porcelain and how this construction breaks up soot or carbon, preventing "shorts."

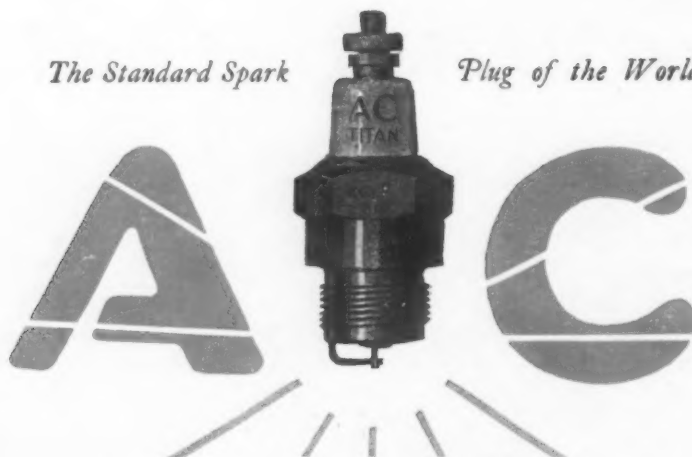
Show how easily the plug can be taken apart and how the porcelain is replaceable in case of accident.

You will find that Ford owners welcome a chance to escape common plug troubles. And when you anticipate their needs, you render a real worth-while service.

Sell AC Spark Plugs by the Set

The Standard Spark

Plug of the World



We Are Doing Our Part You Must "Ask 'Em to Buy"

In the AC Line you have the best merchandising proposition ever offered to dealers.

With a complete stock of AC Plugs you are in position to meet the requirements of all your customers. And when you do stock the complete line you need not tie up money in other spark plugs.

AC 1075 is the best spark plug ever designed for Ford engines. It gives you first place in the biggest market in your community.

We are giving you the best spark plugs, we are giving you the best advertising and we are giving you the selling helps which connect your store with this advertising.

The rest is up to you.

Your customers will not walk in and take spark plugs away from you.

To make the most of the help we are giving you, you must get back of this merchandising plan and work.

Customers like attention. Anticipate their needs. That is the way

to give real service and hold your customers.

When a man asks for a spark plug, the chances are he is in trouble. That is your chance to help him. Ask how his engine is running; find out if he is using correctly designed plugs; ask how old his plugs are. He probably needs a new set of AC's.

Check up on the spare plugs he carries and sell him extra plugs on the spot.

Remember, every motorist who comes to your store is a good AC prospect.

If you haven't the AC Quick Seller, order one now and give it a prominent place in your store. Be sure to have all types of AC's to meet all your customers' needs.

If you haven't an AC window transparency send for one now as well as for our other dealer helps. These link your store with our big advertising campaign and help you get more spark plug business.

Get back of the AC Line and push. It will be the most profitable line you handle.

AC Spark Plug Company, FLINT, Michigan

U.S. Pat. No. 1,186,727, April 13, 1916, U.S. Pat. No. 1,216,129, Feb. 12, 1917. Other Patents Pending

Sell - AC Spark Plugs by the Set

Taking Advantage of a Great Public Tire Demand



NE significant thing that most tire dealers have noticed during the present busy season—

A much larger number of motorists are asking for *certain definite tires and insisting upon having them* than ever before.

Such big selling tires, for instance, as the 30 x 3½ USCO and the U. S. Royal Cord.

Sizes and treads that total up into millions of dollars in sales annually for the U. S. Tire Dealer.

The trend of this mass of satisfied tire users is probably best shown by the constantly increasing number of worn tires that are being replaced with U. S. Tires.

Indicating a great settling down on the part of motorists to tires of known quality and established reputation.

United States Tires
are Good Tires

A settling down to regular trade with dealers operating under the U. S. Sales Relationship.

* * *

The dealer who becomes identified today with U. S. Tires places himself in line to take advantage of the most widespread sweep of tire opinion that has ever developed in this country.

A movement that carries with it assured results in steady local retail growth.



Copyright
1922
U. S. Tire Co.

United States Tires

United States  Rubber Company

Fifty-three
Factories

The Oldest and Largest
Rubber Organization in the World

Two hundred and
thirty-five Branches

Where other Plugs Fail —use the **BOSCH**

A NEW car—valves seating snugly and timed just right. Gaskets tight, compression good—small chance of spark plug trouble here. "Any plug will do," you say. And so it may—for a while.

But, all cars are not new. Many are old and worn. Oil creeps up. Carbon forms quickly. The old style manifold prevents proper vaporization of the low grade fuel of today. When these cars were built, we had 70 proof gas—now it's 45 and 50. Such engines miss and spit at every start. They are beginning to "go bad."

There you have the big reasons for the increas-

ing sale of Bosch Plugs everywhere.

Service men are realizing that bad acting motors require more than ordinary spark plug quality. They are putting in Bosch Plugs wherever there's a sign that a plug will be soon needed, or a new set will improve engine performance. Bosch Plugs have an amazing way of making good where other plugs fail.

Places Where The Bosch Plug Makes Good

It is the usual thing for Bosch Plugs to make good where other plugs fail.

In heavy duty motors, high powered cars, trucks, tractors and marine engines, where high compression makes ordinary plugs leak and misfire.

In worn motors where excess oil mixing with the incoming gas makes regular firing difficult.

In unbalanced motors where the extreme vibration loosens ordinary plugs and causes them to leak, miss and short.

In motors equipped with old style manifolds; where low grade fuel is not properly vaporized.

In magneto equipped motors where the strong high tension sparks quickly burn away the soft electrodes of ordinary plugs.

In such cases where other plugs fail, Bosch Plugs prove their superior quality, workmanship and design.



The **BOSCH**

BOSCH STARTING - BOSCH LIGHTING - BOSCH MAGNETOS



AND WHY BOSCH?

Simply because no other plug has a 25,000 volt proof insulator, an insulator that the most intense high Tension Magneto currents cannot break down.

No other plug has the heat resisting insulator that the hottest engines cannot crack, nor have they the ever-wearing, nickel steel electrodes found only in Bosch Plugs.

Nor the Bosch knife-edged electrodes that give a ribbon spark of twice the usual flaming surface—that vaporizes as well as ignites.

Nor the leak proof, gas tight, wedge construction which helps make Bosch Plugs remarkable.

And, because no other plug insulates the vibration and shock cushioning copper asbestos packing glands from heat as do Bosch Plugs.

Bosch Plugs are made in 7 different types (serving 95% of all motor vehicles) and sell for \$1.00 each. If you have a bad acting motor, you'll be surprised at the difference Bosch Plugs will make.

The better Jobbers distribute them.

AND WHAT IT MEANS TO YOU

Bosch's many Distributors enable dealers to make more money on less capital.

This service cuts the cost of obtaining stock—you buy in smaller quantities—turning over your stock investment more often and thus increasing your "net."

Write for complete details of this Bosch Plan of distribution and sales plan—write now.

American Bosch Magneto Corporation, Springfield, Mass.
 NEW YORK DETROIT CHICAGO SAN FRANCISCO

More than 512 Bosch Service Stations—everywhere—carry out the Bosch pledge of responsibility. A service responsibility to all Bosch Products that is always available as long as the product continues to exist.

Here highly trained technical men give advice—make adjustments and repairs—and genuine replacement parts are always available.

And backing this nation-wide service group are 42 Distributors and 4 Branches. It is the most extensive, as well as the best, Service Organization of its kind in the world.



Spark Plug

BOSCH BATTERY IGNITION - BOSCH SPARK PLUGS - BOSCH



POWER



POWER is obtained by proper combustion.

For proper combustion **QUALITY SPARK PLUGS** are essential.

On a hill or under a heavy pull a good plug is appreciated.

Why sell a faulty constructed plug that pre-ignites, or fouls? This causes **CARBON**, and carbon is expensive. Carbon costs the average motorist many dollars for removal and repairs, besides the money lost in wasted **POWER** and gas.

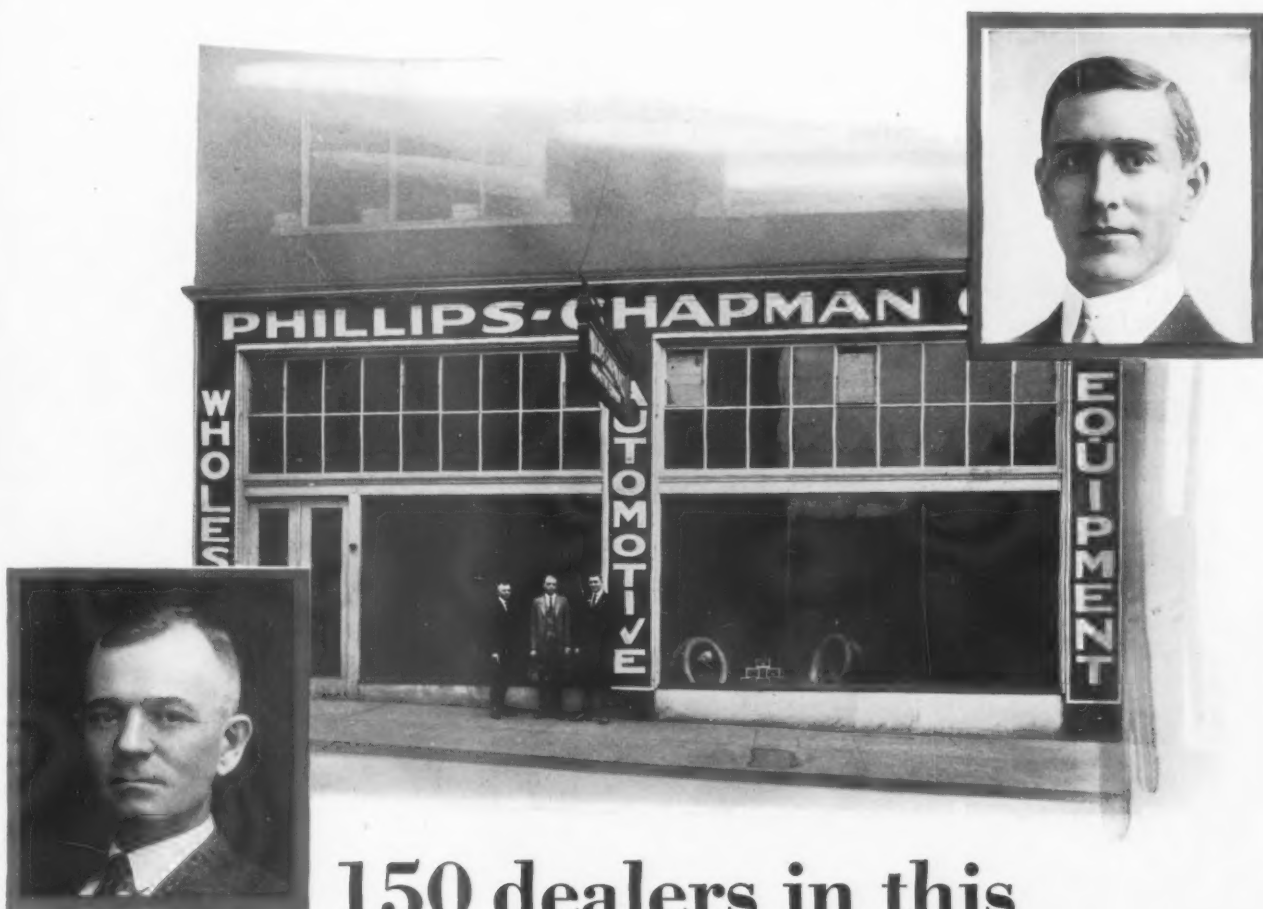
THE RENTZ SPARK INTENSIFYING PLUG is a guaranteed "quality plug" having a controlled intensifier. This permits a **HOT SPARK** to be regulated to the requirements of each cylinder, giving proper combustion and **MORE POWER**.

DEALERS—A RENTZ Contract means a wide margin of profit. Write and allow us to explain our sales co-operation to you. Our extensive dealer helps and national advertising campaign means a quick turnover.

RENTZ SPARK PLUG CO.

Peachtree St.

Atlanta, Ga.



150 dealers in this territory saw it as "the way out"

How a group of live tire men in Tennessee actually increased their profits in a year of many failures

ACCORDING to the reports of one of the great national credit bureaus, one-third of the tire dealers of the country failed last year—another third barely broke even.

Yet, in the territory around Nashville, Tenn., a group of live dealers found their way through the depression and are looking forward to an increased volume of business for the coming year.

In 1919, the Phillips-Chapman Company, of Nashville, took on a new line of tires. The popular lines they had been carrying required tying up too much capital in a wide variety of treads and sizes. And too many adjustments had been necessary. They saw that what they needed, if they were to get through the

slump, was one tire of a quality that would be instantly recognized and with a margin of profit that would repay them for their selling efforts. They selected the Thermoid Crolide Compound Tire.

"Our success with this new tire," writes Mr. Phillips, "was almost immediate. The Crolide Compound story is convincing both to customers and to dealers. 150 dealers in the territory around here recognized the possibilities of this new tire as soon as it was brought to their attention. In the past year these dealers have, almost without exception, weathered the depression with flying colors. Throughout the territory the tire is giving remarkable mileage, and many of the dealers have not had to make a single adjustment to date."

Stories such as that of the Phillips-Chapman Company, told above, are coming in from dealers and distributors all over the country. On all kinds of roads, under all sorts of conditions, Thermoid Tires are setting new mileage standards.

The two illustrations opposite show clearly just what Crolide Compound means in producing more even-textured, longer wearing rubber for tires. The selected materials used in Crolide Compound Rubber are so blended and compounded as practically to eliminate the "lumpy" formations that exist in ordinary tires.

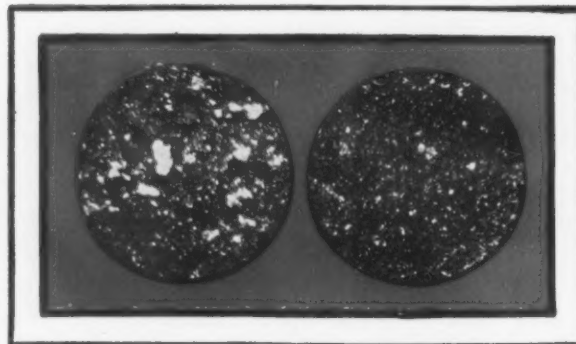
Blowouts, ply separation, tread separation, rimcutting—all the most serious defects in ordinary tires are reduced to a minimum in Thermoid Tires.

What the Thermoid Selling Plan Offers

For some years there has been widespread dissatisfaction with tire profits among dealers and distributors. Small discounts, no protection in your territory, slow repeat sales, no exclusive selling points—these have been the evils.

To help dealers and jobbers to greater profits and repeat sales, to give free play to their sales ability, to reward them properly for their sales effort, the manufacturers of Thermoid Tires offer a real selling proposition:

1. A tire with distinctive selling features.
2. List prices that are right; adjustments on a long mileage basis.
3. Exclusive sales territories to distributors with the proper qualifications.
4. A discount that properly compensates the distributor for selling as well as distributing.
5. A sales asset in the prestige of the Thermoid Rubber Company, whose name and reputation are known to the trade and motoring public everywhere, as a result of extensive national advertising of quality products for more than ten years.
6. Intensive consumer advertising and sales co-operation by the Thermoid Rubber Company within the territories of the distributors.



Actual photographs of rubber magnified 200 times

Ordinary tire rubber

The white areas are "lumps" of foreign substances that have not mixed in evenly. Every "lump" is a weak spot that reduces mileage.

Crolide Compound Rubber

has no large "lumps." Notice how finely divided the particles are. This even texture is what makes Thermoid Tires wear so long.

Complete information and name of nearest distributor will be sent to any dealer upon request. A few good territories are still open for high-grade distributors.

THERMOID RUBBER COMPANY

Factory and Main Offices: Trenton, N. J.
New York, Chicago, Los Angeles, Detroit, Atlanta,
Boston, Seattle, Cleveland, London, Paris, Turin

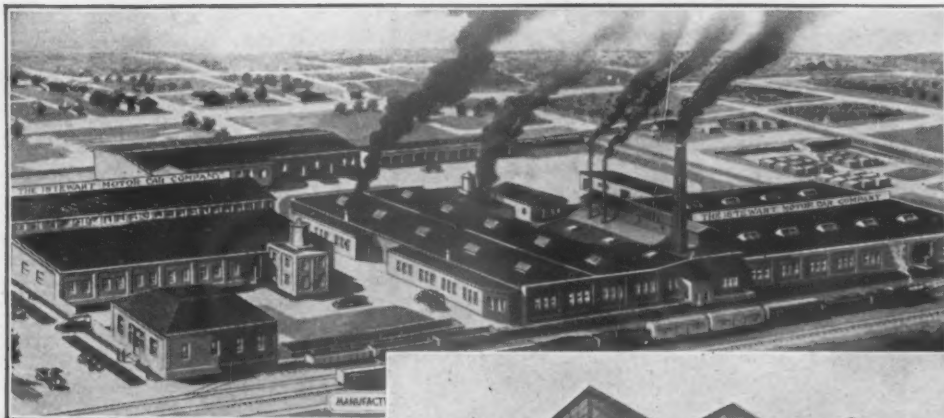
Made of Crolide Compound Rubber, every Thermoid Tire whether Cord or Fabric, is even textured. This is why it can be said to be equal to its oversize in any ordinary make



Thermoid TIRES

Crolide Compound Rubber Gives Extra Wear

Three Big Plants Now Producing COATS STEAM CARS



Plant Number One

The [Y.F.] Stewart Motor Car Co. Plant at Bowling Green, Ohio. Engine and Boiler Assembly of Coats Steam Cars.

Plant Number Two

Executive offices of [Y.F.] Stewart Motor Car Co., and Final Assembly and delivery Plant of Coats Steam Cars at Columbus O. Coats bodies are made and painting, trimming and finishing are done here.



Plant Number Three

At Louisville, Kentucky, manufacturing the Cumberland Cord Tires with which all Coats Steam Cars are equipped.

Any one wishing to see George A. Coats will find him either at the Columbus, Ohio, Plant No. 2, or at the Chicago address below. All Dealers and Prospective Dealers are invited to visit this fine plant.

\$1085



Coats Steam Car Co., Exclusive Selling Agents

2337 Michigan Avenue, Chicago, Illinois



TRADE MARK
TREX
REG. U.S. PAT. OFF.
AIR VALVE LOCK

**Positively Locks
the Air in Tires**
pump your tires only once

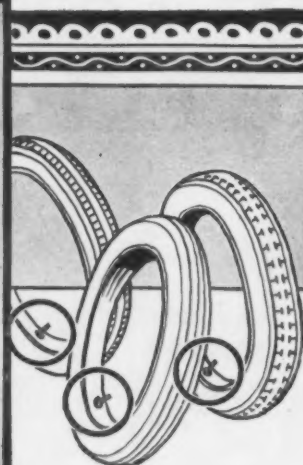
Costs only \$1.00 for each tire
Pays for itself in extra mileage
Greatest Invention since The Cord Tire
GUARANTEED
AS ARE ALL TREX PRODUCTS

*Fits
any
tire
made—
Attach
them
yourself
in three
minutes*

TREX
THE WONDERFUL
AIR VALVE LOCK

Trex Counter Display

This display, in brilliant colors, is one of the many dealer helps we furnish to back up our national advertising. Write us for this counter display. Sent free to any dealer ordering six or more sets of Trex Locks.



Trex Air Valve Lock

Fits any tire. Any motorist can attach in three minutes. Nothing to take care of.



40 MILLION Auto Tires In Use

Every tire in the United States needs a Trex Air Valve Lock—to lock the air inside; end the repumping nuisance; and give increased mileage through perfect inflation.

It is the greatest invention since the inception of the cord tire, and is one of the very few *fundamental* improvements for the

motor car
made in
years.

That is
why it has
met with
instant fa-

vor with motorists everywhere—why dealers in all parts of the country have written for a stock—why some of the finest jobbers already have signed our generous distributor contracts.

Our direct by mail literature, bill-boards, counter and window displays, and continuous publicity mean an advertising cooperation so complete that the dealer cannot afford to overlook it.

Get them in stock at once for the demand that is constantly growing. Ask your jobber.



THE TREXLER COMPANY-PHILA. PA.

FREE Sharpening SERVICE

Sioux Service Keeps Cutting Tools Sharp—No Charge

K EEN cutting edges and accurate angles are absolutely necessary in Valve Reseating Tools. We keep Sioux Cutting Tools in perfect condition for you, at no cost except the carrying charges both ways.

Our special department is equipped and maintained to give this service to users of Sioux Tools only. We do not sharpen other makes of tools.

All Sioux Tools sent us for this Free Service, will be resharpened and returned to you the same day that we receive them.

Take Advantage of This Free Service

W HEN your Sioux Valve Refacing Cutters or your Sioux Valve Seat Reamers get dull, send them direct to us and they will be resharpened at no cost to you. Do not send them through the jobbers, as this only delays the service.

Be sure tools are properly addressed and contain your name and address. Prepay the postage and include sufficient return postage. You need not write us if you are careful to include return postage and address it as follows:

Albertson & Co., Resharpening Dept.,
Sioux City, Iowa. Be sure your name and address are on the package.

Demand Sioux Tools

S AFEGUARD your interests by demanding SIOUX TOOLS and profit by this exceptional Service.

Users of Sioux Tools find it profitable to keep on hand an extra set of Sioux Reamers and Sioux Valve Face Cutters so that one set can be resharpened while the other set is in use.

Remember Sioux Service is for the exclusive use of Sioux Tool Users

All Live Jobbers Sell Sioux Tools

ALBERTSON & CO.

SIoux CITY, IOWA



**"Insures Bigger Profits
Through Better Tools"**

They'll Say It With Money

—A Little Thing Like a Thread May Start A Continuous Stream of Profits



the money is yours—and plenty of it. You're ready, and that's what catches their fancy.

Getting ready is a matter of sending for the little Shop Book published by GTD: It tells what GTD has done to fit you for matching any thread that ever bobs up. It helps you to pick out the ideal screw plate for your particular needs, and the right reamer and drill assortment for the character of work you do.

GTD is a good name to have around. It is a mark of tool integrity—the kind of tools that win your affection by their long, ungrudging service.

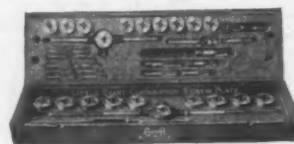
But get the little book. Just mail the coupon, or a request on your letterhead, and we'll send it.



"THE WELL EQUIPPED SHOP GETS THE BUSINESS"



Hexagon Rethreading Die Set for work in inaccessible places. The dies will go anywhere a nut will go, and can be used in any socket, "S," or monkey wrench.



A "Little Giant" Combination U. S. S. and S. A. E. standard thread Screw Plate. One of these sets is absolutely necessary in every shop which has a service department.



This is a GTD No. 2501 screw plate for Ford Cars. In addition to taps, dies, etc., it has two special Ford reamers. One for spindle arm and body bushings, one for piston pin bushings.



Demand GTD Twist Drills for your Drill Press, Electric or Breast Drill. Quality? We only ask you to run a competitive test with any other make. High Speed or Carbon. That GTD trademark guarantees them.



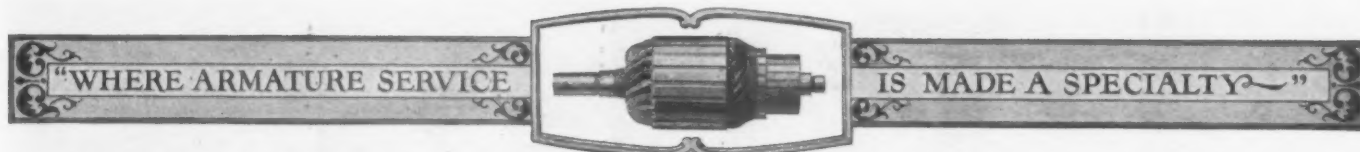
GTD taps are accurate and carefully designed to give maximum service.



This is a special adjustable reamer. Several unique features. The range of adjustment is .042 inch. A few will replace a large number of solid reamers, etc. I want that little book about screw plates. I want your general catalog on screw plates, taps, dies, drills, reamers, etc. (Mark X after the one you want—or both)

Name _____
Address _____

M.A.6



"Same Day" Armature Service

We can ship you guaranteed rewound armatures the same day we receive the defective armatures from you. We maintain a stock of over 5,000 rewound armatures for this exchange service including every make for automobiles. Our stock of Ford armatures alone is over 2,000.

You can't find a more liberal guarantee than ours. We guarantee every rewound armature we send out to give the same service as a new one. There are no strings to this guarantee — no chance for an argument or misunderstanding.



This shows a section of our Engineering Department

Every Armature Is Rewound to Blue Print Specifications

When an armature goes to the shop to be rewound the blue print goes with it. This insures the armature's being rewound according to the original factory specifications. Before being placed in stock it is checked up with the blue print.

Every armature that goes through our shops is completely overhauled and rewound exactly as the armature was wound originally. We maintain a large force of automotive electricians who do nothing but armature service. Their work is consequently skillful and accurate to the highest degree. Modern, labor saving equipment also adds to the general efficiency of the work.

PRICES

Ford Armature rewound.....	\$2.00
Any two unit generator armature rewound	\$5.00

Distributors Are Wanted

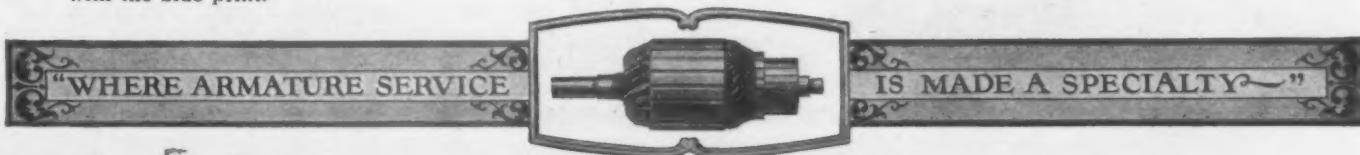
We want to make connections with concerns who can represent us in certain territories and carry stocks of rewound armatures. The investment is not large—the turnover is rapid. If you can represent us properly get in touch with us at once.

U.S. AUTO SUPPLY CO.

ARMATURE SERVICE DIVISION

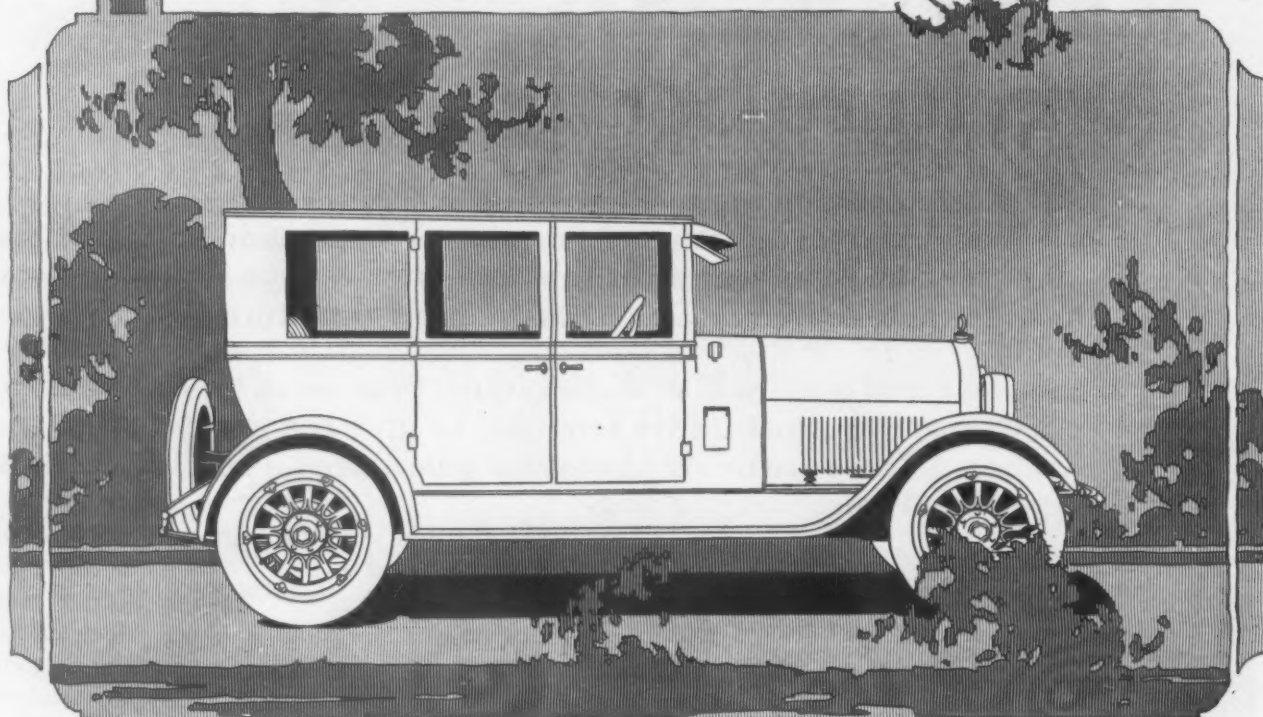
3845 S. WABASH AVE.

CHICAGO



Pilot

THE CAR, AHEAD



THE SEDAN

"Prestige and Profits"

Pilot has developed a New Manufacturing and Sales Policy.

Pilot has created a New Motor Car Class.

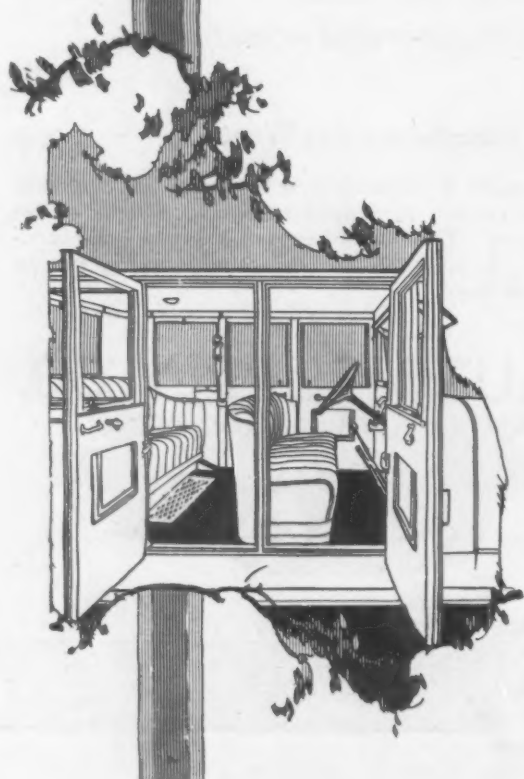
Never before has there been offered a Custom-Built Motor Car at so moderate a price.

Never before has there been presented to Dealers and Distributors a car of such quick sales appeal or a contract with as many attractive features.

Write now for booklet "Prestige and Profits"—a plain Straight-from-the-Shoulder discussion of Automobile Selling.

Let us show you why the Pilot Franchise is a Money-Maker.

PILOT MOTOR CAR COMPANY
Richmond, Indiana, U. S. A.





"We Always Install American Hammered"

That's what the garagemen and cylinder-reginders say, who do high grade work and are looking for permanent profit.

It will pay you to install the permanently leakless American Hammered Piston Rings. There's an immediate money profit—and you can make regular customers out of occasional patrons.

One enthusiastic user, the Schomo Motor Rebuilding Company, Inc., Elmira, N. Y., writes:

"We know from our own experience that there are no better and none as good as American Hammered. We use them in all regrinding and rebuilding jobs."

The tremendous demand for American Hammered rings has made day and night shifts in our Factory absolutely necessary. This comes from Spring overhaul requirements, our new List Prices, and a Quality which does not change. *Ask your jobber.*

American Hammered Piston Rings

AMERICAN HAMMERED PISTON RING COMPANY, Baltimore, Maryland
Export Department, 461 Eighth Avenue, New York, U. S. A.

New Factory List Prices

60c

Up to 4 $\frac{7}{8}$ inches

Special for Ford Type

50c

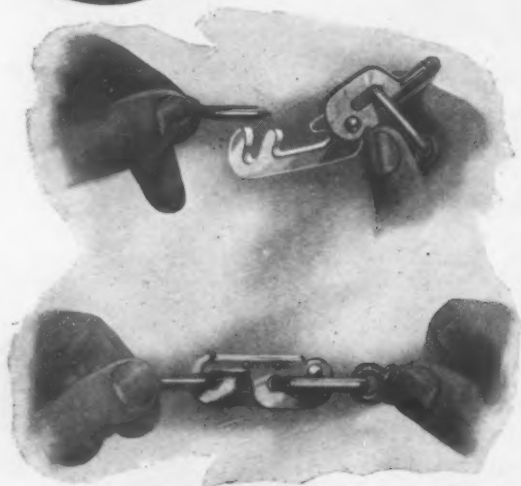
No extra charge for oversizes



A New Tire Chain that Upsets a Tradition

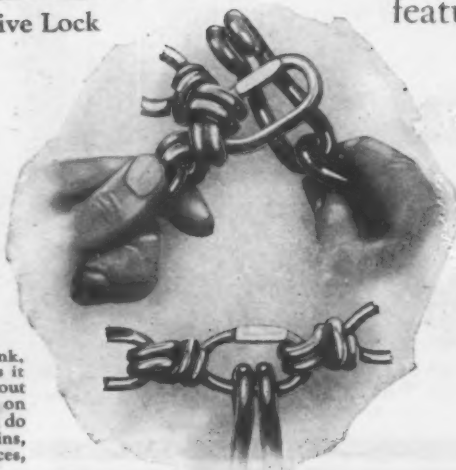
It is called

OFF'N'ON



The Positive Lock

The patented lever lock, illustrated above, makes it easy to put them on and to take them off. It takes up slack, thus saves wear on tires and chains alike. No lost chains—no loose chains. OFF'N'ON has a positive locking device.



The patented slip-on link, shown at right, makes it easy to take off worn-out cross chains and put on new ones. A child can do it. OFF'N'ON Chains, with these special devices, cost no more.

The Slip-on Link

It can be put on and taken off in a hurry. It has removable cross chains that can be replaced anywhere, anytime by anyone, without pliers or other devices—and in an instant.

It has a positive locking device that takes up the slack in the side chain, thus saving wear on both tire and chain.

Because of these unusual and modern features OFF'N'ON Chains is a big profit-maker for jobbers and dealers. *And it costs no more than others.*

Write us for further particulars giving the name of your jobber

**PYRENE MANUFACTURING
COMPANY**

Makers of Pyrene Fire Extinguishers
520 Belmont Ave., Newark, N. J.

Branches:

CHICAGO—17 So. Jefferson St. KANSAS CITY—1712 Grand Ave.
ATLANTA—24 Nassau St. SAN FRANCISCO—977 Mission St.



this over the door

The STOP HERE sign of Raybestos BRAKE SERVICE means Raybestos at the bench, it is true. But it means far more—a man who believes in giving good value; who is a merchant, not an order taker; who will not be content with “cheap” merchandise; who knows the value of intelligent advertising and how to back it up with service.

BETTER RETAIL MERCHANDISING
BETTER BRAKE SERVICE MORE RAYBESTOS SALES

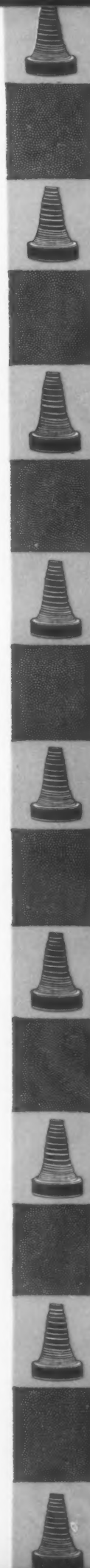
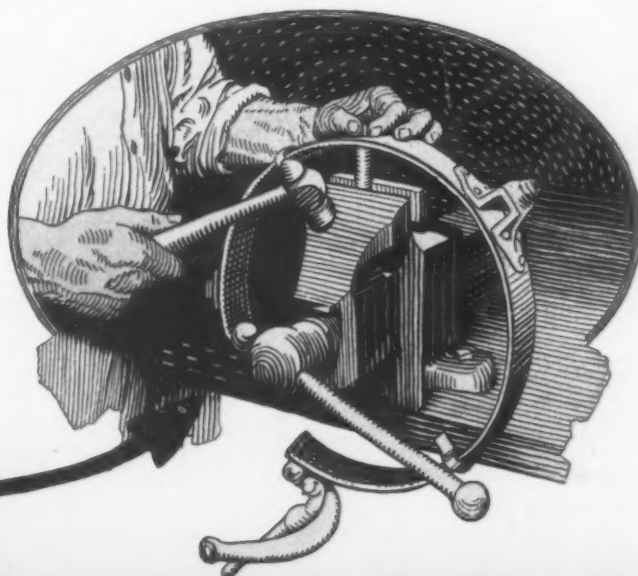
Distributors who sell Raybestos know the Raybestos repairman as a good customer.

THE RAYBESTOS COMPANY

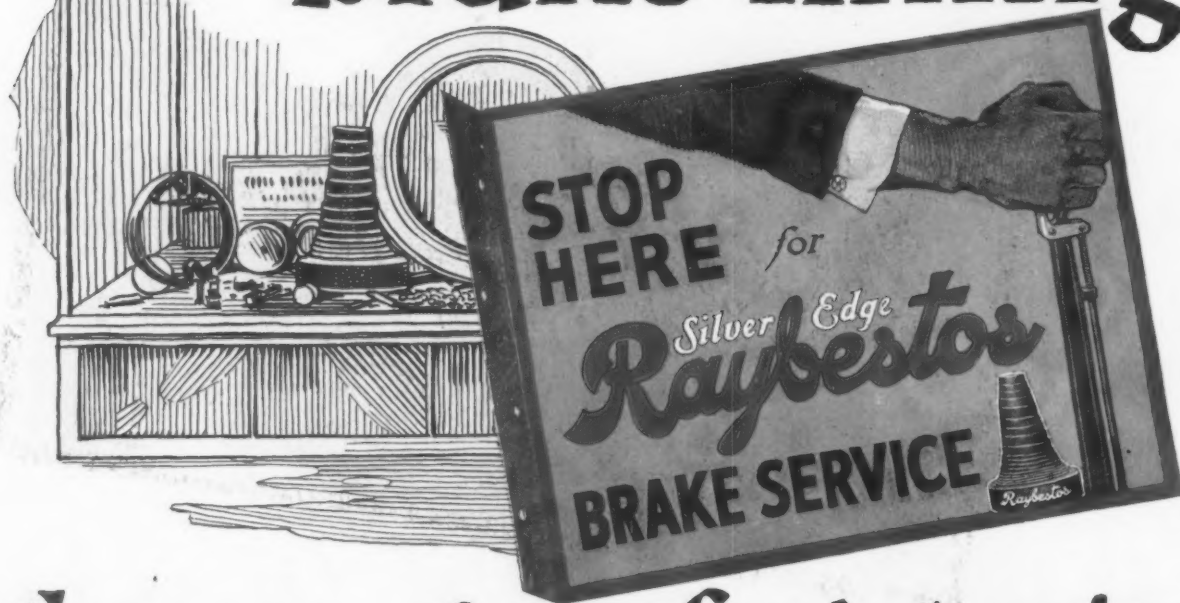
Factories: BRIDGEPORT, CONN. PETERBOROUGH, ONT., CANADA

Branches: Detroit, 2631 Woodward Ave.
Chicago, 332 South Michigan Ave.
San Francisco, 835 Post St.
Washington, D. C., 107 Columbia Bldg.

means
Silver Edge
Raybestos
at the bench



bigger than brake lining



*these are times for intensive
merchandising -*

This merchandising problem is far bigger than the selling of brake lining, or spark plugs, or piston rings. It is the problem of turning every opportunity to profit — of making sales.

The STOP HERE sign of Raybestos BRAKE SERVICE above your door is a notice to the world that you are on the job, alive to the needs of modern business, part of a great organization—in short, a giver of reliable service and a dependable merchant. It pays.

(Are you watching our National Advertising?)

vigorous merchandising of a
good product for many years
has built *Silver Edge Raybestos* leadership

Away to a Good Start

at the Sign of
the
Orange Disc



GULF
DEALERS
GET THE BUSINESS

GULF REFINING COMPANY
FRICK BUILDING ANNEX
PITTSBURGH, PA.



Just One Connection at the Hand Throttle

Another selling point of the Williams Accelerator is the fact that it requires only one connection on the hand throttle side of the cylinder block—that is the hand throttle connection itself.

There are no intricate attachments to connect to the frame, causing the removal of transmission, water pipe, or engine bolts; no complex arrangement of levers and springs which require special attention when the car is overhauled. A single, simple connection made with a cotter pin, as shown above, is all that is necessary.

It is this absence of complicated parts throughout the Williams Accelerator which gives the driver perfect control over the speed of his Ford. There is no lost motion between the accelerator pedal and the carburetor; nothing to stick, causing jerky acceleration. The action of the Williams Accelerator is always smooth, always certain.

DEALERS: Mention these points to your customers. Order accelerators through your jobber, and our new counter display card from him or direct from us.

WILLIAMS BROS. AIRCRAFT CORPORATION
SAN FRANCISCO



WILLIAMS ACCELERATOR

for FORD CARS

Beacon Gasoline System

100% Visible — Double Checking

The glass container shows the customer exactly how much gasoline he's getting. The automatic register shows the dealer exactly how much goes into or comes out of the underground tank. Everybody concerned gets a square deal and sees the proof of it.

Strong and sturdy in every part, simple in construction, efficient in operation—these are Beacon features. Every Beacon System carries the approval label of the National Board of Fire Underwriters. All measuring devices are secured from the Bureau of Standards of the U. S. Government. There could be no better guarantee of accuracy. Furnished in hand operated or electric driven models. Write for our illustrated catalog which describes the many models of Beacon Systems.

Valuable territory open for District Managers.

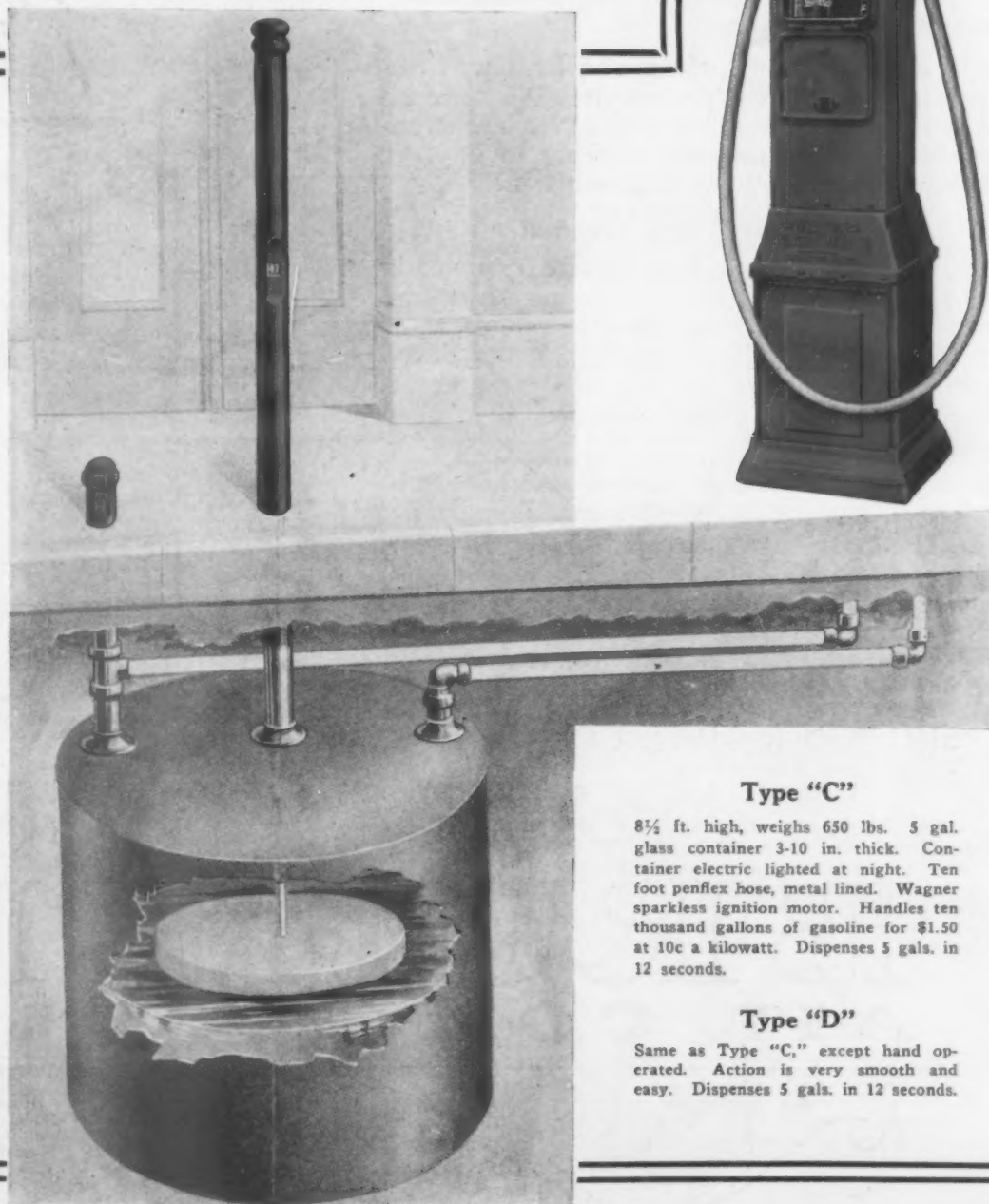
BEACON VISIBLE PUMP CO. INC.
700-800 W. Breckinridge St. Louisville, Ky.



Fire Underwriters' Approval

The label on every Beacon System is a protection to you. It is your assurance of safety and one of the big reasons why you should invest in a Beacon System.

The Motoring Public Wants to See Everything It Pays for, Including Gasoline



Type "C"

8½ ft. high, weighs 650 lbs. 5 gal. glass container 3-10 in. thick. Container electric lighted at night. Ten foot penflex hose, metal lined. Wagner sparkless ignition motor. Handles ten thousand gallons of gasoline for \$1.50 at 10c a kilowatt. Dispenses 5 gals. in 12 seconds.

Type "D"

Same as Type "C," except hand operated. Action is very smooth and easy. Dispenses 5 gals. in 12 seconds.

How Old Is "Old"?

"When a Compressor gets old—", said the Garageman.

"What do you mean, 'old'?" asked his helper.

THERE is quite a difference between an "old" Ford and an "old" Rolls-Royce—probably 300,000 miles, or more.

Why?

Because of materials used and methods of manufacture—that's all.

Quality Construction Lasts

You can't always *see* the difference between a machine that's quality built and one that isn't—*when both are new.* But—as the months roll by—under hard and constant usage—that difference becomes apparent.

Why are all contact surfaces of a Brunner Compressor *ground* to a perfect fit? Why are all working parts "run in" with oil? Why are Brunner Engineers constantly working to improve the design and methods of production?

The Dealer's Best Guarantee

For the same reasons that actuate Brunner in the selection of high grade castings, the careful inspection of all materials, and the construction of specially designed gauges, jigs and fixtures, costing thousands of dollars each in many instances—to assure exact co-ordination of compressor parts.

How old does a Brunner Compressor have to be before it ceases to do good work? We do not know. We've been making them for 20 years, and none, so far as we know, has as yet worn out.

The habit of precision in manufacture is the garage-man's best guarantee that his compressor is worth every cent he paid for it.

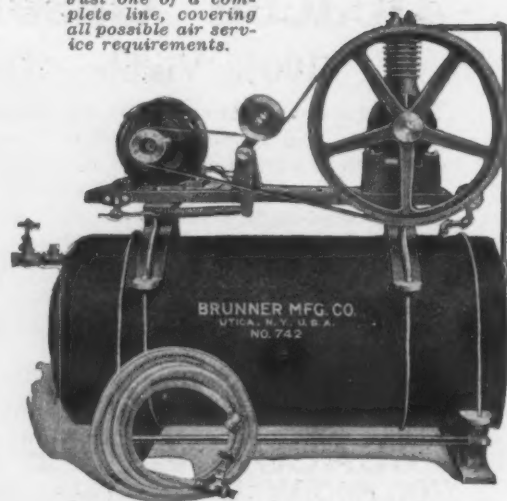
BRUNNER MFG. COMPANY

Oldest and Largest Manufacturers of Air Compressors in the World

UTICA, N. Y.

Sales Offices: Utica, Cincinnati, Kansas City, San Francisco and almost every Jobber from Maine to California

Just one of a complete line, covering all possible air service requirements.



QUANTITY production permits pricing Brunner Quality Compressors at same figures as any ordinary compressor of similar capacity.

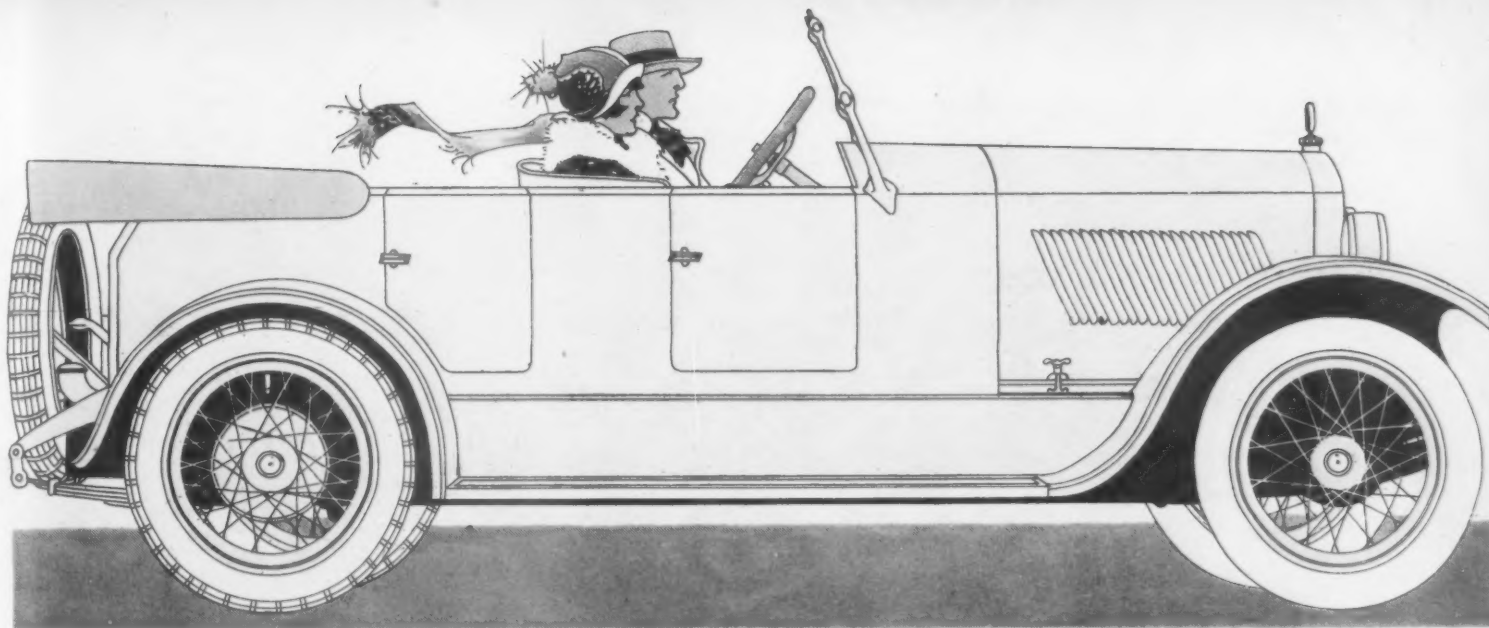
Valuable Book Free

A very interesting 24-page book on The Principles and Methods of Air Compression will be mailed to you upon request.

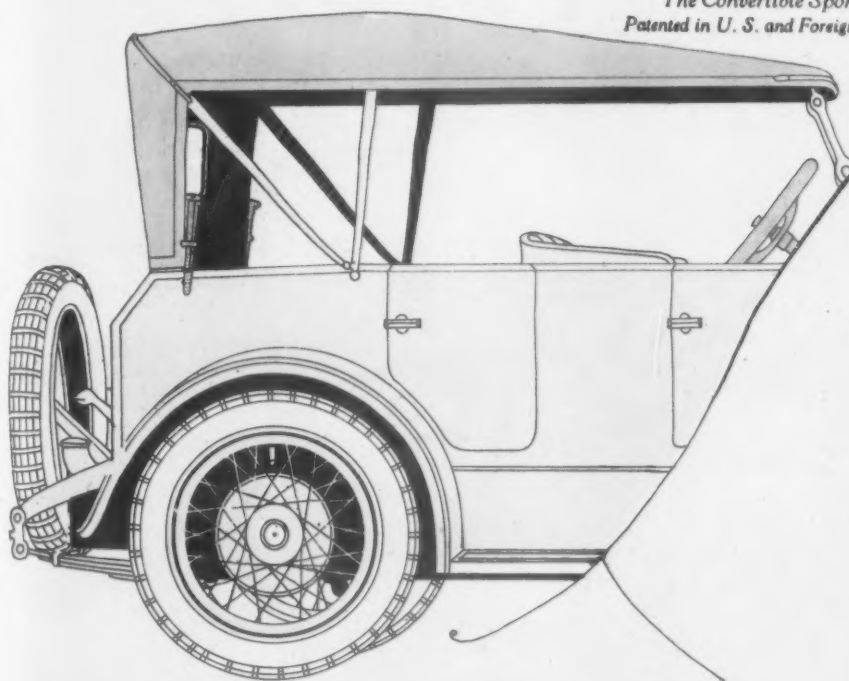
BRUNNER

BRUNNER

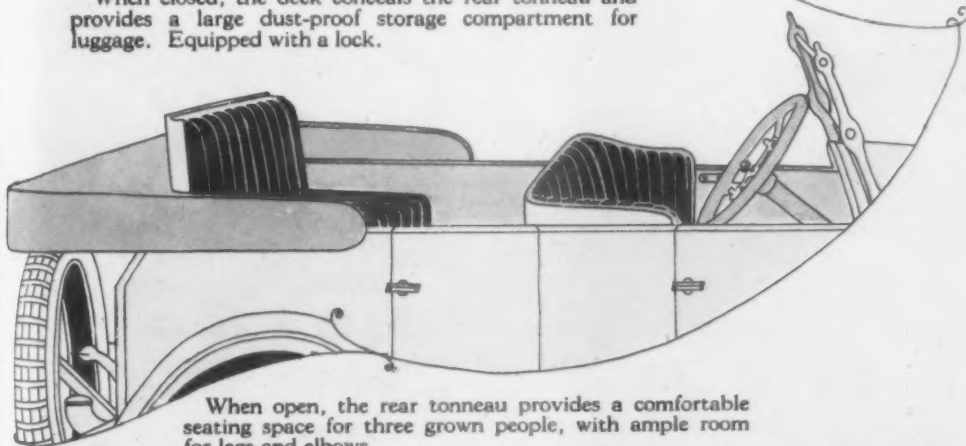
AIR COMPRESSORS



The Convertible Sport Car
Patented in U. S. and Foreign Countries.



When closed, the deck conceals the rear tonneau and provides a large dust-proof storage compartment for luggage. Equipped with a lock.



When open, the rear tonneau provides a comfortable seating space for three grown people, with ample room for legs and elbows.

YOU'D never guess, to see this graceful roadster go gliding by, that its trim rear deck concealed a full three passenger built-in seat.

Yet in an instant the deck can be raised, the rear seat swings automatically into place—and, presto, you are looking, not at a roadster, but at a *five passenger touring car*. The rear seat is upholstered in deep pleated leather over high quality cushion springs, as is the rear seat of any regular Anderson touring car.

This Convertible Roadster is an exclusive Anderson patent, designed and built by Anderson coach makers to fill a need felt at times by nearly all motor car owners.

Like all other Andersons, it shows in its every line and detail the thoroughbred *coach built* quality for which Anderson has been famous for more than a third of a century.

Mounted on the standard Anderson chassis, and powered with the wonderful new Continental 7-R six-cylinder motor, the Coachbuilt Convertible Sport Car provides you with an *all purpose car* of rare beauty, comfort, power and economy.

Fully equipped including 4 cord tires and extra rim,

ANDERSON MOTOR COMPANY
ROCK HILL, S. C.

OTHER MODELS

7-Passenger Touring
5-Passenger Touring
4-Passenger Sport

2-Passenger Speedster
4-Passenger Coupe
5-Passenger Sedan

Ultra Sport Touring

Cord tires are standard equipment.



As long as you sell a car that in performance and mechanical specifications is like every other car in its price class, you will lack the security and business certainty that go with selling a car such as the Anderson.

When your business begins to depend upon how good a salesman you are, and not how good your product is, its foundation is crumbling. And is it not purely a matter of salesmanship when every claim you make for your car can be just as truthfully made for any other car?

Anderson brings you relief from this struggle with burdensome odds. Against a field of stock production cars, differing from each other but slightly in point of detail, you offer the Anderson Coachbilt Six—a distinguished custom made product which in all models easily ranks in appearance and finish with cars in the most expensive class.

Just how the dealer benefits by Anderson's thirty-five years of fine coach building, will be told to you if you are interested in the Anderson dealer franchise?

Shall we send you our plan?

ANDERSON MOTOR COMPANY

Rock Hill, S. C.

Eastern Wholesale Dep't

489—5th Avenue, New York City





Who Makes the Wheels?

A question of rapidly increasing importance to distributors and dealers—Who Makes the Wheels? Units so important should be a positive sales asset. Wheels produced by Motor Wheel are so good they do add measurably to the value of the car you sell.

Millions of passenger cars and trucks, in operation all over the world, add lustre daily to the reputation of the exceedingly fine wheels we make.

Experience which extends back to the earliest days of the automotive industry—control of every operation from forest tree to finished wheel—unsurpassed facilities for quality and quantity production—have won for Motor Wheel Corporation its proud position among the world's very largest producers of motor car and truck wheels.

Their excellence can be capitalized to add to the selling prestige of your car or truck.

MOTOR WHEEL CORPORATION, LANSING, MICHIGAN

Motor Vehicle Wheels Complete — Metal Stampings — Steel Products
Gier TUARC and Gier-LEWIS Steel Wheels for Passenger Cars



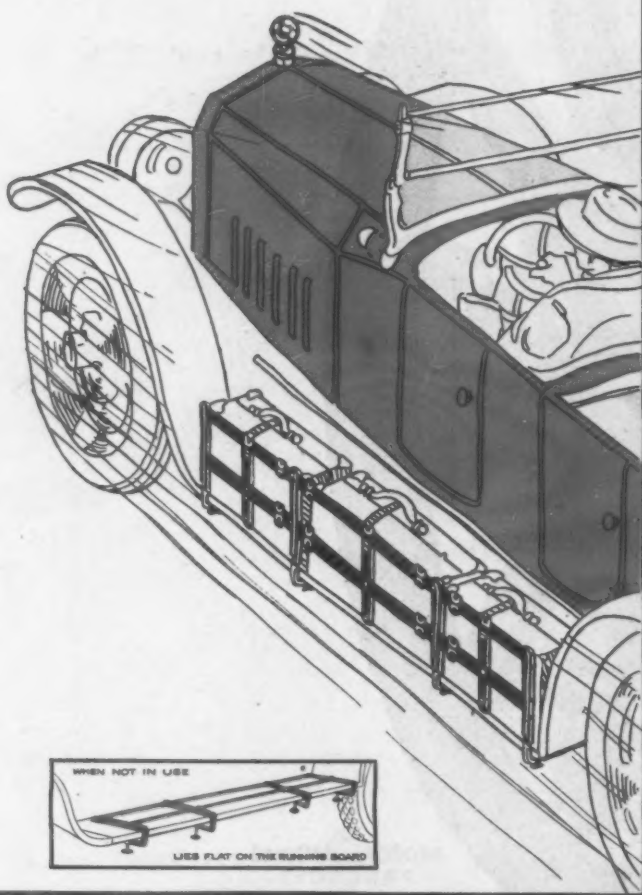
**Motor Wheel
PRODUCTS**

MARQUETTE

LUGGAGE CARRIER

*Sold by Live Jobbers
and Dealers*

Dealers: Your jobber can make you an attractive proposition on the Marquette. Ask him.



WITH a Marquette you can enjoy all the conveniences of a luggage carrier, without the risk of marring the fine finish of your car.

The luggage is **strapped** to the carrier, and held fast, away from the body of the car. It can't bounce around and scratch the car, or get lost. Strong web straps, with a metal plate clamp, hold the baggage securely to the carrier.

When the Marquette is not in use it **folds right down flat on the running board**. There's no need to take it off or climb over it when not in use. Once installed it is always ready.

Neat appearance. Its trim straight lines conform to the lines of your car—enhancing its appearance.

Extra Strength. The Marquette is held by four big clamps to the running board. The uprights are made of special high-grade carbon steel—pressed into a channel shape that gives them tremendous strength. The cross bands are cut from flexible rolled steel that “gives” with bulging baggage but does not bend out of shape.

Fits any running board. Made in 2 sizes, both adjustable in length, 4 ft. and 5 ft. when extended. When set out to full capacity it adds 2½ inches in width to the baggage space. Easily attached without tools.

Every desired advantage—capacity, convenience, safety, strength—is to be had in the Marquette. It's a **quality** product—through and through.

MARQUETTE MFG. CO.

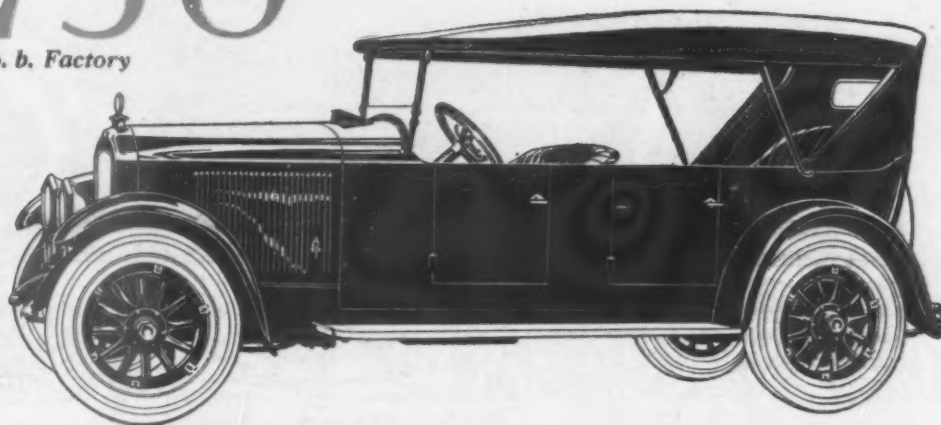
St. Paul, Minn.

National

1922-SIX

\$2750

f. o. b. Factory



Never Before—a National *better or more profitable*

The best evidence of the value of a franchise to sell National cars is the *value* of the 1922 National Six, itself. At \$2750 it establishes a standard of quality not to be duplicated in the fine car field.

From a mechanical standpoint, the 1922 National Six offers advantages which override competition. The *low-speed test*, inaugurated by National, has revealed the efficiency of the car in a manner that is making a deep impression on buyers wherever Nationals are sold.

Dealers will do well to investigate the National as a powerful adjunct in acquiring added business of exceptional profit. We are able to accommodate a limited number of additional dealers. Write us for particulars.

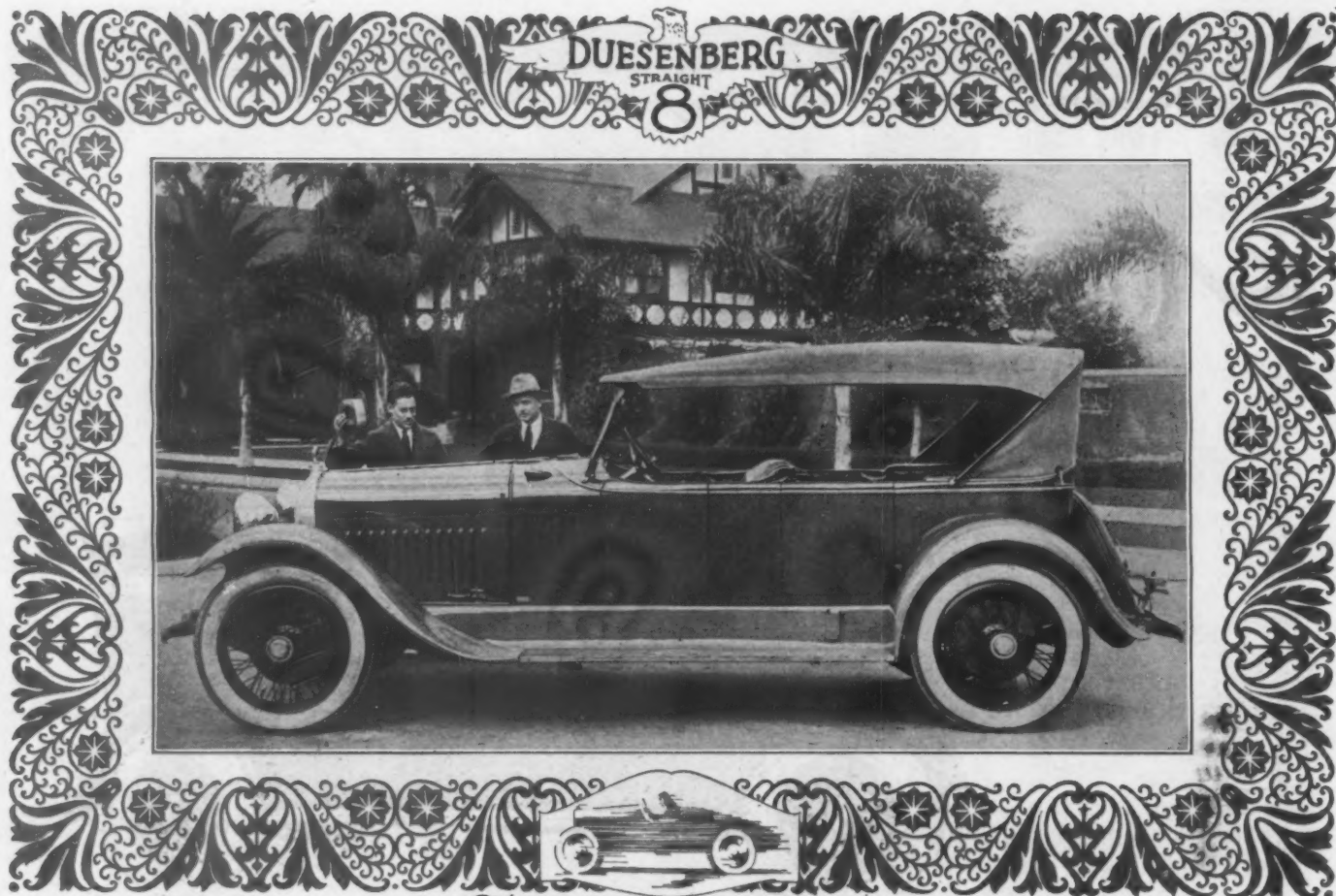
NATIONAL MOTOR CAR AND VEHICLE CORPORATION
Indianapolis, Indiana

The Low-Speed Test

Inherent defects in balance; deficiencies in power development and application; shortcomings in fuel distribution, and many other negative factors in car operation which are *bridged over* and concealed when a car is driven at the customary speeds can be detected when a car is throttled down in high gear.

The ability of the 1922 National Six to creep along not at the usual 2 or 3 m.p.h., *but at less than a single mile* with absolute silence and smoothness and then respond with equal facility to the accelerator, without missing a single "shot," attaining a speed of 30 m.p.h. in 9 seconds and advancing to more than 70 m.p.h. in a few seconds more, proves its unequalled mechanical excellence.

Few cars dare undertake the *low-speed test*. It requires something more than the usual commercial accuracy of manufacture. It demands a minute precision that is secured only by most exacting standards and finest engineering.

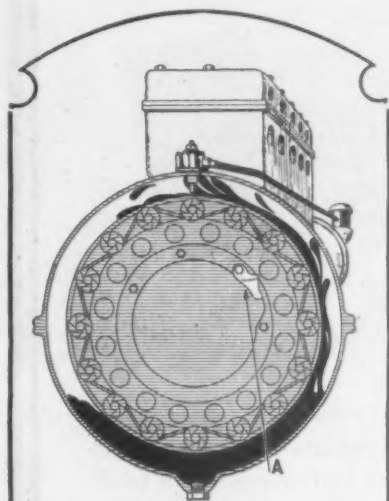
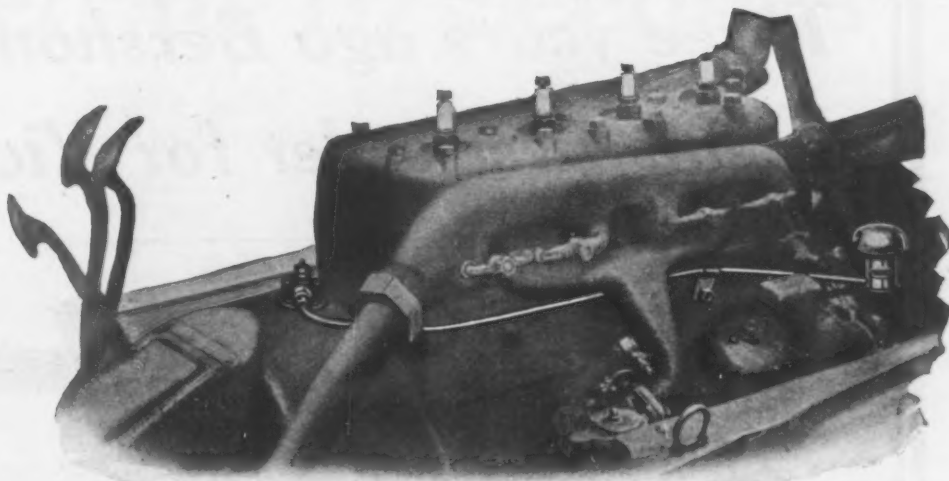


Consider it from any angle you will—power, comfort, flexibility, speed, roadability, endurance—you will find the Duesenberg Straight 8 a car of unmatched performance and rare excellence.

Duesenberg Automobile & Motors Co., Inc.
Indianapolis, Indiana

"Built to Outclass, Outrun and Outlast Any Car on the Road"

It Forces the Oil as Needed!



Note how the oil is thrown directly into the hollow magneto plug and shunted into the distributing tube.

The faster the flywheel turns the more oil is thrown, therefore, the oil flow varies with the engine speeds and is automatic.

The Toquet means adequate oil always but never too much.



Putting the Toquet Oiling System on a Ford is as simple as screwing on a spark plug and yet it is the most amazingly efficient oiling system ever devised.

Instead of depending for circulation on the splash of the oil into the regular Ford funnel (see A at left) the Toquet takes the oil direct from the revolving flywheel with the full centrifugal force behind it.

Thus the tendency of the Ford to lack oil at high speeds is entirely overcome because the flow of oil through the Toquet varies directly with the speed of the flywheel.

The Toquet is simply a brass tube from the special hollow magneto plug (replacing old one) to the Breather Pipe which is provided with an extension.

There is no guess work about the Toquet. Take off the Breather cap at any time and you can see the flow of oil. At high speed it's a steady stream—at low speeds its entirely ade-

quate. It is actually automatic. The whole device can be taken off and cleaned in a few minutes if it becomes clogged. There is no need of dismantling the engine as with the regular Ford oiling system. A tremendous advantage.

The Toquet means adequate oil on the timing mechanism and to all other moving parts regardless of grade or speed. It is the best possible insurance against scored cylinders and burnt out bearings.

Every Ford owner needs a Toquet and will have it. At \$2.50 it is a wonderful dealer opportunity.

Write today for the discounts.

Reliance Automotive Devices, Inc.
243 W. 55th Street, Dept. F2, New York

The

TOQUET
SAFETY FIRST
OILING SYSTEM
FOR FORDS at

\$2⁵⁰ is the biggest
dealer opportunity of the
year.

QUICK
TURNOVER

RELIANCE-DEVICES

TOQUET TIMER ROLLER

\$1⁰⁰

for Ford Cars—a self-lubricating, self cleaning roller that smooths out old contacts, doubles life of shell and delivers all of the sparks.

RELIANCE Radio Light OIL GAUGE

for Fords—shows oil level from driver's seat—day or night (radium treated). Attached to lower petcock with dial on dash. Fool proof, unfailing.

\$3²⁵

Three years ago Bershon gave us his first order for Victor Tires

Here Is What He Thinks Of Our Proposition

Los Angeles, Calif., March 20, 1922.

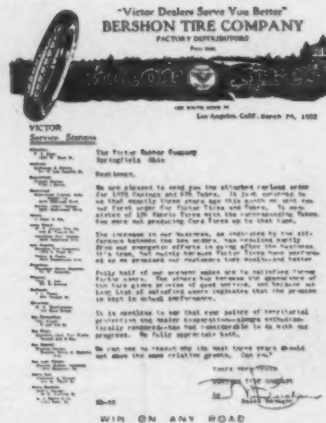
The Victor Rubber Company,
Springfield, Ohio.

Gentlemen:

We are pleased to send you the attached car load order for 1070 Casings and 676 Tubes. It just occurred to us that exactly three years ago this month we sent you our first order for Victor Tires and Tubes. It consisted of 176 Fabric Tires with the corresponding Tubes. You were not producing Cord Tires up to that time.

The increase in our business, as indicated by the difference between the two orders, has resulted partly from our energetic efforts in going after the business, it's true, but mainly because Victor Tires have performed as we promised our customers they would—and better.

Fully half of our present sales are to satisfied former Victor users. The others buy because the appearance of the tire gives promise of good service, and because our long list of satisfied users



indicates that the promise is kept in actual performance.

It is needless to say that your policy of territorial protection and dealer co-operation—always enthusiastically rendered—has had considerable to do with our progress. We fully appreciate both.

We can see no reason why the next three years should not show the same relative growth. Can you?

Yours very truly,

BERSHON TIRE COMPANY.

NB-GG

By N. Bershon, Sales Mgr.

We are offering to distributors in open territory the same whole-hearted co-operation that built success for the Bershon Tire Company

THE VICTOR RUBBER COMPANY

Makers of Rubber Tires for 23 years
SPRINGFIELD, OHIO

Victor Tires



Cleaned in 10 Seconds

The Ford Owner

is sure up against it when his magneto point needs cleaning. It's up to him either to get out the old screw-driver and go after it himself (a messy job), or else dig up about a dollar and a half and hire a service man to do it. In both cases he's in for a delay of at least an hour.



Packed in handsome individual boxes. A gross to the fibre carton.

\$1.50

the price

They can't resist

Right here is where the NUPPOINT comes in—

For that dollar and a half that he would pay to have the regular magneto point cleaned just once—the Ford owner can buy an improved magento point which he can clean, himself, without tools in ten seconds any time it needs cleaning and which protects him against delays, no matter where he happens to be.

It only takes a few minutes to install the NUPPOINT and the Ford owner can do that too—no tapping nor drilling is necessary.

The NUPPOINT is in two parts—the base, which is attached permanently (using old screw holes), and the Point itself which is taken out and put back in the same manner as a headlight bulb.

Schaefer NUPPOINT MAGNETO POINT FOR FORDS

The NUPPOINT is the 100% magneto point. It means a clean, active contact all the time.

It means a smoother running motor and no power interruptions. It can't leak oil and it can't go wrong in any way.

NUPPOINT is sold through jobbers exclusively and to both jobbers and dealers it offers a big opportunity. The need for it is apparent and the field is tremendous. Don't delay. Write for the discounts today.

For Jobbers

A Miniature Transmission is offered as a sales help. Six of these to you with each gross order.



E. G. OVERLY
Greensburg, Pa.



To Install

- 1 NUPPOINT gasket and ring are placed on magneto point opening.
- 2 The base is then screwed on using old screw holes.

- 3 The NUPPOINT contact is then inserted like a head light bulb.

- 4 The lugs on its sides hold it tightly in place.

- 5 No job at all to clean it.

FREE

The gauge test quickly proves that Holstein Pumps will inflate to more than 200 lbs. pressure—more than enough for any truck tire—and shows that other pumps inflate to less than 100 lbs. To inflate a smaller tire is a "cinch."



Jobbers, Dealers & Distributors.

Write us today, and we will tell you how to secure this invaluable sales making tester, free of charge.

A LONG FELT WANT FULFILLED

J. H. Wilhelm & Son, Myerstown, Pa., writes us: "We have used your pump for eight years. It is positively the best pump we ever used. We haven't found a pump on the market that comes within a mile of it."



Ease of Operation: At last an auto tire pump with which it is easier to produce 200 lbs. pressure than it is possible to produce 80 lbs. with any other hand tire pump.

The Holstein is the most efficient and durable, as well as the most compact and easy to operate of any pump offered the automobile public. It is so vastly different and its superiority over others is so great that it stands in a class by itself. "IT HAS NO EQUAL."

The handle can be adjusted to suit the

height of the operator and adds no length to the pump. This is a new and very valuable and convenient feature. It is only 22 inches long over all, and has a 1 7/8-inch extra heavy brass cylinder—just a snug fit for a 22-inch tool box.

DEALERS AND JOBBERS: Send us your order today. The usual discounts to the trade. Sample pump at trade discounts upon application.

Holstein Manufacturing Co., Inc.

Richland, Lebanon Co., Penna.

IMPORTANT: Some very desirable territory open for live distributors.

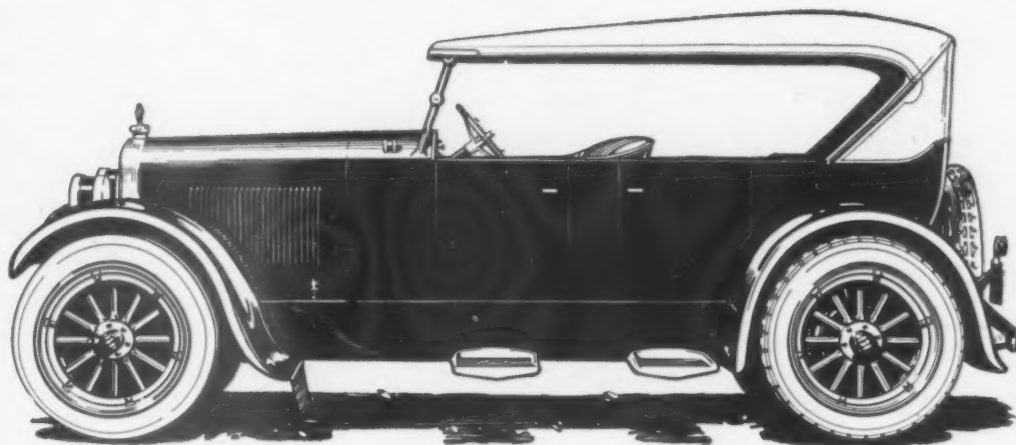
HOLSTEIN

"The Only Pump That Pumps to 200 Pounds"

In a Class By Itself.

"It Has No Equal"

CLEVELAND SIX



The Wonder Car of the Year

\$1195

F. O. B. CLEVELAND

A SUCCESSFUL CAR makes successful dealers. If you want to line up with one of the few large, permanent manufacturers that are producing the "big sellers," now is the time to act.

CLEVELAND AUTOMOBILE COMPANY • CLEVELAND

CLEVELAND SIX SEDAN



Today's Best Buy in Closed Cars

\$1595

F. O. B. CLEVELAND

THOUSANDS of owners of this new Cleveland Six Sedan know that it is today's best buy in closed cars.

Dealer opportunity such as the new Cleveland Six presents, is met with only once or twice in a decade. Your territory may be open. Find out!

CLEVELAND AUTOMOBILE COMPANY, CLEVELAND
Export Dept., 1819 Broadway, New York City. Cable Address "CLEVEAUTO"



Save Your Building Money

By Building an Austin Steelspan Garage

Build an Austin Garage, save money and have a garage that is exactly suited to your needs. Our garage building plan makes this possible. This plan saves your money in every direction. It saves through the Austin Method of Standard Construction that brings building costs down to the minimum. It makes savings for you every month by giving you a layout that insures economical operation.

Read these plans carefully.

PLAN NO. 1—We will build and equip your garage building complete for a lump sum price. This plan applies especially to concrete and multistory types of garage buildings.

PLAN NO. 2—We will furnish materials, complete working plans,

and provide an Austin construction man to act as your superintendent.

PLAN NO. 3—we will furnish materials and complete working plans for erection and supervision by your own forces or others.

Austin world-wide building reputation is your assurance of the best building service. Austin has built many of the largest plants in the country, including garages of all types. Austin has invariably delivered the most building for the given amount of money. Use the Coupon Today.

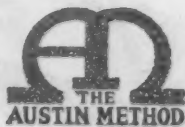
THE AUSTIN COMPANY, Cleveland, Ohio

Architectural Engineers and Builders

CHICAGO DETROIT PITTSBURGH PHILADELPHIA
NEW YORK DALLAS ST. LOUIS

THE AUSTIN CO. OF CALIFORNIA, LOS ANGELES

AUSTIN



The Austin Company, Cleveland.
We are contemplating the construction of a garage building and would be pleased to have further information. It is understood that this request places us under no obligation.
The Plan checked below is of particular interest to us.
Plan No. 1 _____ Plan No. 2 _____
Plan No. 3 _____
Firm _____ Individual _____
Address _____

M. A. 5-25

Double Your Annual Dividend

From the Man Who Is Going on a Motoring Tour

You make as much profit from a single set of Ride Rite Springs as you probably could from a complete overhauling of the tourist's car, minus the grief. When a man is going on a long trip with his family he wants RIDING COMFORT; he is the best kind of a prospect for a set of Ride Rite Springs.

You, as a dealer, can add a lot to the pleasure and economy of such a trip by installing a set of RIDE RITE SPRINGS. You hit your man when he is exactly in the right frame of mind if you suggest such an installation at the time he is all keyed up for his trip. Try it! "Ask 'em to buy!"

Harvey advertisements in the Saturday Evening Post, reaching more than two and a half million readers, are carrying a special message for automobile tourists during the summer months. This publicity is educating motorists everywhere in the important matter of proper spring design and its relation to riding comfort, mileage economy, and car-depreciation saving. You can make this advertising earn a good profit for you by hooking it up with YOUR BUSINESS.

The Harvey turn-over policy absolutely protects you against dead stocks. If you are not a Harvey dealer, let us give you all the facts in regard to becoming identified with this foremost line of automobile springs. Write today.

HARVEY SPRING & FORGING COMPANY, Dept. 14, Racine, Wis.

Boltless
Automobile
Springs
For All Cars





Now's
the Time!

*Monkey Grip is
the Patch*

THE season's here! Folks are driving about—and punctures creep up to claim their hapless victims.

Tell your customers about Monkey Grip, the World's Best Tire Patch. Urge them to buy this handy little Service Station in the Tool Box and—they'll BLESS you when trouble comes.

Best of all, you'll both profit in the transaction.

Let's go! At the new prices—Monkey Grip is selling faster than ever, making more friends and piling up profits for the dealers. Order from your jobber or use the handy coupon.

The Moco Company of America
Oklahoma City, Okla.

"THE WORLD'S BEST TIRE PATCH"
MONKEY GRIP
A PERMANENT TUBE REPAIR

- No. 1 Small
Contains 27 square inches Tube Patch, complete with tube of Cement and Buffer..... **\$0.50**
- No. 2 Medium
Contains 45 square inches Tube Patch, complete with tube of Cement and Buffer..... **\$0.75**
- No. 3 Large or Motoring
Contains 72 square inches Tube Patch, complete with tube of Cement and Buffer.... **\$1.00**

**The Moco Company
of America**
Oklahoma City, Okla.

Ship the following Monkey Grip Tire Patch at once:

Small _____ dozen

Medium _____ dozen

Large _____ dozen

Dealer's Name _____

Street _____

City _____

State _____

Ship through _____

(Jobber's name here)



These Dealers Are Making Money! So Can You—Write Us

The Rickenbacker line is being handled by some of the most important dealers in the country. We cannot attempt to list them all in this limited space but the following are a few:

Hunt Motor Car Company—New York City
L. Markle & Company—Chicago
Cunningham-Richards Company—Detroit
National Motor Car Company—Boston
Flanders-Smith Company—Baltimore
B. W. Lemmon Company—Pittsburgh
Leon T. Shettler—Los Angeles
Chas H. Kaar Company—San Francisco
York Motor Sales Company—Buffalo
C. E. Stebbins—Milwaukee
Geo. A. Morse, Inc.—Minneapolis
H. A. Dougherty Motor Company—Kansas City
J. G. Wilmoth—Indianapolis
Don Hogan—Denver
Howard Motors Inc.—Providence
The Columbus Stutz Motor Co.—Columbus
The Britton Company—Hartford

These are merely a few of the high spots. They are big dealers and they are making money on the Rickenbacker line.

We are in production now shipping quantities of cars daily and can take care of all requirements in all territories.

We want a few more new dealers and our increased production makes it possible to give new dealers immediate deliveries.

Write at once for full details of the famous Rickenbacker—the vibrationless Six.

Rickenbacker Motor Company
Detroit Michigan

Rickenbacker

A · C · A · R · W · O · R · T · H · Y · O · F · I · T · S · N · A · M · E

Organization Builds Success

\$1485

5-Passenger Phaeton

\$1885

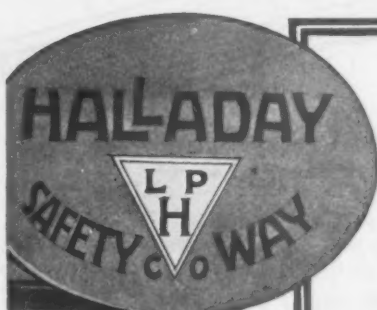
4-Passenger Coupe
Prices F. O. B. factory

\$1985

5-Passenger Sedan

HALLADAY

"The GOOD OLD NAME Means Better Bumpers and Shock Absorbers."



66 $\frac{2}{3}$ % More Protection Than Required

"Halladay" Doubleface Scroll Spring Steel Bumpers deflect only 1-3 (33 1-3%) of the amount allowed by the Underwriter's Laboratories. This additional protection takes them out of the class of ordinary bumpers and explains "Halladay" SERVICE.

Spring Bars and all fittings are heat treated and oil tempered; have exceptional strength without unnecessary weight; are beautifully finished in nickel plate over rust-preventing buffed copper or in black baked japan; truss spring construction, scroll ends, double bar (6 $\frac{1}{4}$ inch impact face) assures wide spread distribution of all collision forces—these explain "Halladay" qualities.

Approved by Underwriter's Laboratories "Halladays" provide a 12 $\frac{1}{2}$ % reduction in collision insurance premiums on fully equipped cars—that explains "Halladay" SAVINGS.

These things combined — SERVICE — QUALITY — SAVINGS—all explain why you should buy "Halladay" Bumpers.

Ask Your Jobber for "Halladays"

He has, or can get them quickly. Write for free Bumper, Shock Absorber and Accessory catalog. Give us the name of your favorite jobber.

L. P. Halladay Company

Dept. 2

Decatur, Illinois, U. S. A.

"Ask 'em to buy 'Halladays' "

Attractive Display Rack Free With First Order of Five





40,000 Axles carried in stock for 400 models of cars and trucks.

Why not try the same thing in your town?

Jones looked into the matter and found that of the five thousand or more cars in his town and the surrounding towns nearly one thousand had had axle shaft replacements the previous year and in each case the new shaft had to be ordered outside and the job held up until it arrived.

This looked to Jones like an opportunity for someone to make some real profits—besides give some real service. So Jones put in a Butler assortment of axle shafts which included all the models he was apt to need and got himself all set for this business.

And the thing turned out just about as Jones had figured. First one car and then another was towed around

to his place and was given a new shaft in jig time. No wait and everybody happy.

Presently as the news spread Jones' place came to be known as the place where one got real service and quick action. Jones sold replacement shafts to the other garages too—at retail prices with 10% added for handling. His shop became the center for all replacement work.

Jones increased his stock. He's still at it and going strong. "Best little old investment I ever made, that first order of shafts," he says.

Why not try the same thing in your town?

BUTLER AUTOMOTIVE STEEL COMPANY
EASTON, PENNA.

Leading Replacement Axle Manufacturers in America

Assortment
No. 1 \$75.00

Write the factory for the three
assortment lists, at bedrock prices
for quality shafts.

Assortment
No. 2 \$125.00

Assortment
No. 3 \$200.00

BUTLER

REPLACEMENT SHAFTS

AXLE SHAFTS—PROPELLER SHAFTS—PINION SHAFTS

Let the Vacuum do it!

Power aplenty—we've harnessed it to the Tire Pump

The Whitted Vacuum Driven Tire Pump takes its power direct from the intake manifold or from the vacuum line if the car has a vacuum tank.

It's simpler

Thus—instead of an added system of gears which had to be grafted onto the transmission and which generated too much heat and was slow and mechanical at best—instead of this the power is received through a tube all ready to use, and no gears are necessary and no heat is generated.

The efficiency of the Whitted

Vacuum Driven Tire Pump is actually amazing. It will inflate to 125 pounds pressure if desired and it will do this quicker than any other engine driven air pump of its size in the world.

Clean, cool air

It pumps clean, cool air into the tires and does it easily, quietly, smoothly unfailingly. It needs no attention—it doesn't even need oil. Put it on and forget it.

Because it's small and compact it can be installed anywhere on any car and it only

takes from ten to thirty minutes to do the job.

If desired only the connection fitting need be installed. The pump itself can be carried under the seat and attached in a minute when needed.

You can Sell it!

You can sell the Whitted easily—in fact if you display it you can't help but sell it. The motorist will want it because it comes closer to meeting his needs than anything he has ever seen. He'll want it because it's less expensive and he can install it himself. A great opportunity is open to you. Now is the time to seize it.

Liberal discounts are offered. You'll want to know about them. Write us today. Now.

Vacuum Pressure Products Co., Inc.,
105-115 South Calvert St.,
Baltimore, Md.

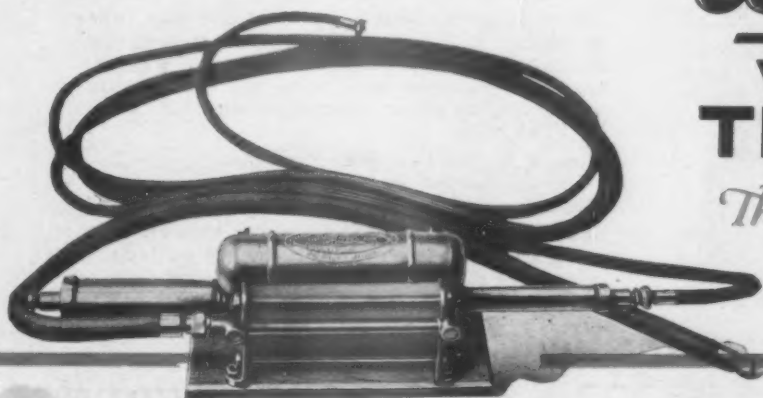
\$16.00

is the list for the whole equipment complete. 15 feet of hose and all fittings ready to install. The war tax is paid.

Whitted

VACUUM DRIVEN TIRE PUMP

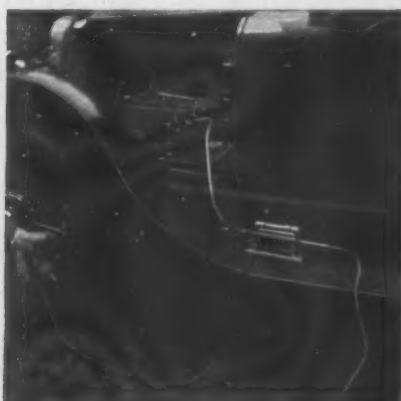
The pump for every car



1 The ideal place for a pump. Under the hood out of the way and yet easy to get at.



2 Keep it under the seat if you want to and when you use it put it on the running board.



3 If the car is equipped with a vacuum tank, simply put the T connection, which comes with the pump, on the vacuum line—that's all.



You have until June 15th

Because of the many orders we have received for this low-priced library edition of popular automobile guidebooks, we are extending our special offer to readers of MOTOR AGE until June 15th. Any orders received on or before that date will be immediately filled at the reduced prices.

Return Privilege Guarantee

Your remittance merely acts as a deposit. If at the end of 10 days you decide that you do not want the books, return them to us and we will refund your deposit.



1. ELECTRICAL EQUIPMENT SERIES

AUTOMOBILE ELECTRICAL SYSTEMS

By David Penn Moreton and Darwin S. Hatch

An analysis of all the systems now used on motor cars with 200 wiring diagrams. Special electrical specification tables are given for all makes of cars and for different years which eliminates all guesswork. Regular Price \$3.50.

ELECTRICAL EQUIPMENT OF MOTOR CARS

By David Penn Moreton and Darwin S. Hatch

This book is a working guide on the installation, care and repair of the starting, lighting and ignition systems of all cars, with 256 blueprint wiring diagrams. With this book it is an easy task to trace out and locate all cases of electrical trouble in a very definite and systematic way. Regular Price \$3.50.

Special offer expiring June 15th—\$5.00

2. BETTER MECHANICS SERIES

AUTOMOBILE REPAIRMAN'S HELPER—VOL. I

By S. T. Williams and J. Howard Pile

An invaluable reference for the mechanic, owner, chauffeur and student, giving in concise form every operation required to adjust or repair the troubles likely to be found in all standard cars. Regular Price \$3.00.

BATTERY SERVICE MANUAL

By Donald D. Blanchard

A guide for the battery repairman and shop owner in testing, locating troubles, making repairs and charging batteries, with a trouble chart in which all known defects are listed with the cause of the trouble and the proper remedy opposite each. Regular Price \$2.50.

AUTOMOBILE REPAIRMAN'S HELPER—VOL. II

Just Published March, 1922

This new book is right up to the minute and contains such new chapters as General Shop Practice, Storage Battery Equipment and Repair, Passenger Cars, Parts and Equipment. Regular Price \$3.00.

MODERN METHODS ON FORD REPAIRING

By J. Howard Pile

A complete manual for the Ford repairman, explaining the use of all the up-to-date tools and shop equipment, and minutely describing the methods of performing the work on all the mechanical parts of the car. Regular Price \$2.50.

Special offer expiring June 15th—\$8.50

U. P. C. Book Company, Inc., 243 West 39th St., New York.

I have checked below the books I wish to examine, and enclose remittance of \$_____ with the understanding that, if they are not what I wish, I may return them within ten days and my money will be promptly refunded.

.....Elec. Equipment Series, two volumes, \$5.00

.....Better Mechanics Series, four volumes, \$8.50

.....Complete Library of all six volumes, \$13.50

With \$13.50 order, remit only \$6.50 now and balance of \$7.00 within ten days, at which time Repairshop Short Cuts will be sent FREE.

Name.....

Address.....

City and State.....

M. A. 5-25-22

This book sent FREE

AUTOMOBILE REPAIRSHOP SHORTCUTS (regularly sold at \$3.50) will be presented Free to every purchaser of the Complete Library (six volumes). This book will be sent you when your second payment on the Library is received. See the coupon for easy-payment plan.

**No orders filled after June 15th
MAIL THE COUPON TODAY**

U. P. C. BOOK COMPANY, INC.,
243 WEST 39TH ST., NEW YORK.

SHE'S the greatest
little lamp seller
in the world

—and she can help
you sell six Edison
MAZDA Automobile
Lamps where you've
been selling one.



Ask 'em to buy~

44 THE SATURDAY EVENING POST April 1, 1922

The Proper Edison MAZDA Lamps for your car



You specify the oil for your car—specify the lamps

They are even more important. The right kind of oil will lengthen the life of your car. But your own life, in a moment of crisis, may depend upon the performance of your lamps.

So it pays to say: "A new kit of Edison MAZDA Lamps, please." Instead of merely "a new bulb." You are sure, then, of three things:

1. Lamps fitted especially to your particular make and model of car. See the chart at the left.
2. Lamps backed by MAZDA Service.

centered in the Research Laboratories of the General Electric Company. The same kind of lamps that have given your home better light and greater comfort at less cost.

3. Lamps that will give maximum light with minimum drain on your battery.

These three advantages are worth the effort of seeing "Edison MAZDA Lamps."

Keep an extra kit in the pocket of your car. The lamps are packed securely in the kit; always and everywhere they are dependable.

MAZDA Lamp Number 1129, 1130	52 cents each
MAZDA Lamp Number 61, 62, 63, 64	33 cents each
MAZDA Lamp Number 1141, 1142	45 cents each
MAZDA Lamp Number 67, 68	50 cents each
MAZDA Lamp Number 1126	50 cents each
MAZDA Lamp Number 1136	80 cents each

EDISON MAZDA LAMPS
EDISON LAMP WORKS OF GENERAL ELECTRIC

51 THE SATURDAY EVENING POST February 4, 1922

your lamps
—the biggest little things about your car

WHEN one of your lights has died and you stop at an accessory store or garage, it's worth while to say—
"I want a new Edison MAZDA Lamp."
If you say merely "I want a new bulb," you may get an Edison MAZDA Lamp—and again you may not.

Your lamps are the biggest little things about your car. They mean increased confidence in night driving, less drain on your battery and, naturally, less expense.

You have probably proved the comfort and economy of Edison MAZDA Lamps in advantages on wheels and take them wherever you drive!

Miniature Edison MAZDA Lamps for your car are sold by automobile accessory stores and garages all over the country. Let them light up the dark for you. They're Dependable!

EDISON MAZDA LAMPS
EDISON LAMP WORKS OF GENERAL ELECTRIC COMPANY

Edison MAZDA Automobile LAMPS

National advertising is making them the biggest little profit maker in your store

NINE out of ten car drivers use MAZDA Lamps in their homes; but nine out of ten still ask merely for "a bulb" when a light goes dead. Only two out of ten carry spare lamps.



Through five full pages, in two colors, in the Saturday Evening Post we are teaching car drivers this year to specify Edison MAZDA Lamps as they specify oil, and to carry a kit of spare lamps as they carry spare tires.

We have prepared a complete dealer sales campaign to help you tie up with the advertising and sell six lamps where you've been selling one. Ask your jobber's representative about it today.

What Edison MAZDA Auto Lamps mean—

TO YOUR CUSTOMERS

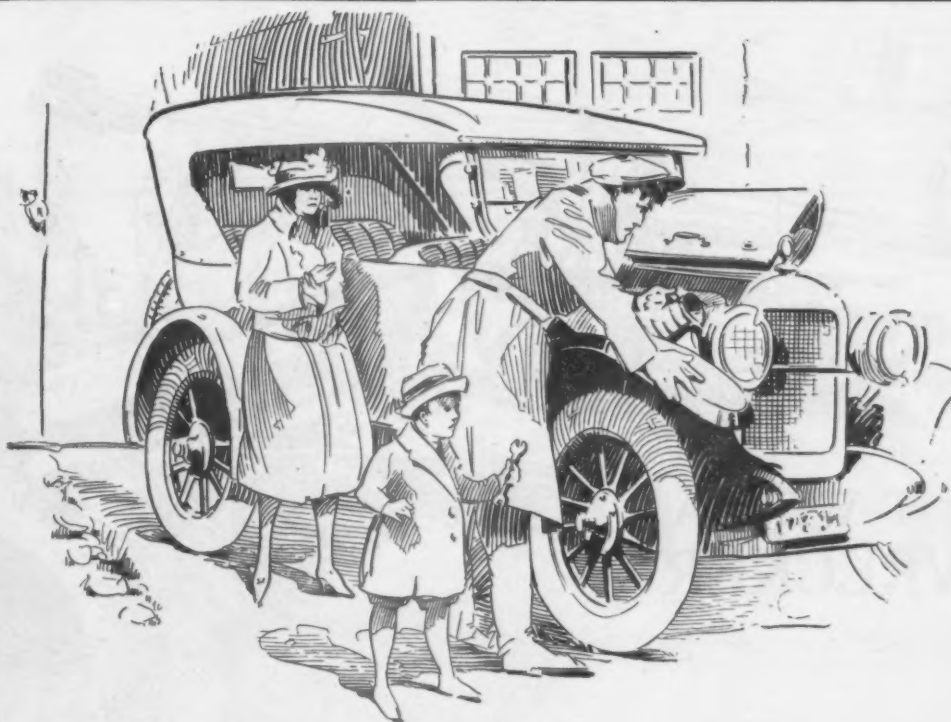
1. Dependable lamps.
2. Greater safety in night driving.
3. Minimum drain on the battery.
4. Confidence in you.

TO YOU

1. Lamps of uniform quality and standardized sizes.
2. Less stock investment.
3. Bigger profits through quicker turnover.
4. No sales resistance.
5. Sales by the kit.
6. Satisfied customers.

EDISON MAZDA LAMPS

EDISON LAMP WORKS OF GENERAL ELECTRIC COMPANY



SAVING THE OIL AND THE GAS

FOR YOUR
CUSTOMERS BRINGS
THEIR FULL APPRE-
CIATION OF THE
VALUE OF YOUR
SERVICES.

FOSTER PISTONS

not only can save the gas, and the oil for your customer but they will give his car that snappiness, that quick-get-away and eliminate all annoying and troublesome piston slap.

Foster pistons have thin uniform wall thickness re-enforced with ribbing to make them strong. The thickness of

the metal in the head together with the ribbing is just the right amount of metal to carry off the heat and prevent carbon formation underneath the head. The special oil groove with its drain holes collects the surplus oil and returns it to the crank case thus eliminating oil pumping.

These are just a few points of the FOSTER piston that will pull trade your way.

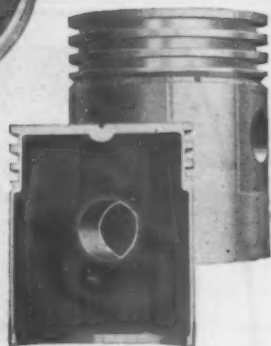
The keen foresighted service men not only are using FOSTER pistons but they have equipped themselves with the F-J Cylinder reamer and are doing the cylinder re-reaming right in their own repair departments. Doing it without removing the block from the chassis. It's the most profitable part of the whole repair job. With the F-J Cylinder reamer you can do more work and make more profit with a nominal charge for the work, than with any other tool for the same purpose on the market today.

See these pistons and reamers at your jobber's. Judge them for yourself, or get our large catalogue.

FOSTER PISTONS GIVE 7 to 10%
MORE POWER THAN ORDINARY
FACTORY PISTONS, BECAUSE
THEY ARE 30 to 40%
LIGHTER.



Look for
the box
with the
GREEN border.



The sensible light weight piston.



The F-J Cylinder Reamer
at work

FOSTER-JOHNSON REAMER CO.

1092 BEARDSLEY AVE.

EIKHART, IND.



YOU CAN DO IT WITH A HOLMES WRECKER

With a HOLMES WRECKER you can handle any wreck regardless of its condition with very little expense and without further damage to the wrecked car.

You save time and money and make satisfied customers. If your service car is not already equipped with a HOLMES WRECKER write us today for complete specifications.

Fits any towing car or truck chassis.

ERNEST HOLMES CO., **CHATTANOOGA, TENN.**

New Departure Ball Bearings

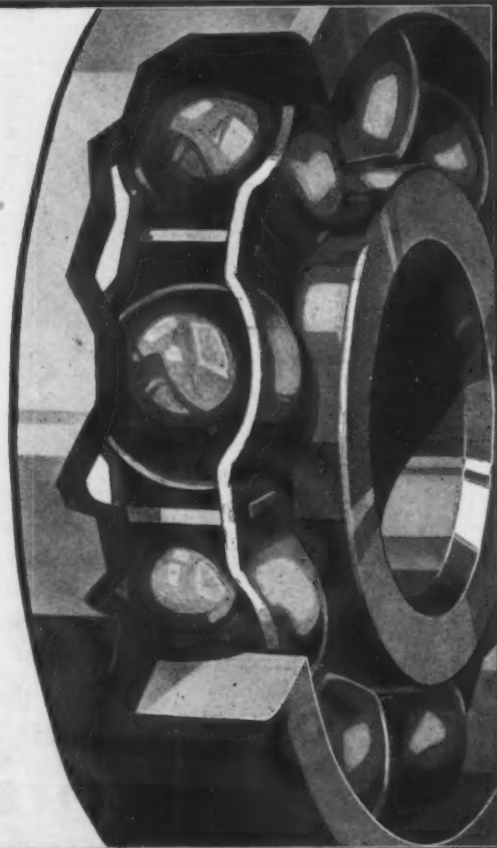
—are made of the finest high carbon chrome alloy steel.

—in factories that have grown to be the largest of their kind in the world because excellence of product has created ever-increasing demand.

—quality of product is the result of consistent adherence to high standards of material, workmanship, precision, finish and engineering.

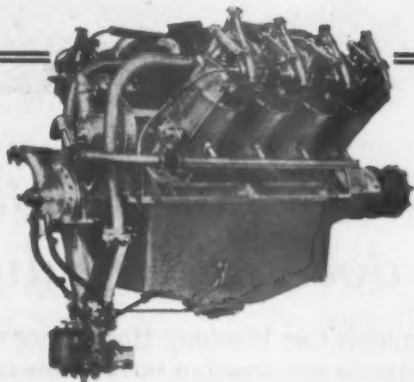
The New Departure Mfg. Co.

Main Office and Works: Bristol, Conn.
Detroit Chicago





"Pep Up" that Old Bus



With a Curtiss OX-5 Airplane Motor

The War Department is offering you a chance to make a regular speed-wagon out of the old boat. Install one of these motors and it will do the rest. The Government is selling 3365 of them, and you can buy one or the entire lot. Of course, the more you buy, the cheaper the Government can afford to sell.

These motors will be sold as follows:

40—New, at Park Field, Millington, Tenn.

215—Used, same storage.

Bids opened in Washington, D. C., June 15th, 3 P. M.

(Eastern Time).

2542—New, at Little Rock, Ark.

568—Used, same storage.

Bids opened in Washington, D. C., June 29th, 3 P. M.

(Eastern Time).

General description of this motor follows:

8 cyl., 4-cycle, 4x5, Vee type, water cooled; 90 H.P. at 1400 r.p.m.; high tension magneto, force feed oiling; Duplex Zenith carburetor; weight, 390 lbs. without oil or water. Installation dimensions: Length overall, 55 $\frac{3}{4}$ in.; width, 29 $\frac{3}{4}$ in.; depth, 35 $\frac{1}{8}$ in.; width at bed, 12 $\frac{7}{8}$ in.; height from bed, 17 $\frac{3}{4}$ in.; depth from bed, 13 $\frac{3}{4}$ in.

Bids will be accepted on all or any part of the offerings, and no special form of bid is required. The Government reserves the right to reject any or all bids. For complete information, and in transmitting bids, address

Also to be sold are 16 new Curtiss JN4-D airplanes, complete with OX-5 motors, stored at Park Field; and 22 airplanes, Curtiss JN4-D, without engines or instruments, stored at Curtiss Elmwood Air Reserve Depot, Buffalo, N. Y.

Chief, M. D. & S. Sect., Air Service,

Room 2624, Munitions Bldg., Washington, D. C.



WAR DEPARTMENT



Makes a Very Handsome Auto Top

The new pebble grain finish has a lustre and substantial appearance that makes it stand out with an individuality and distinctiveness above regular top materials.

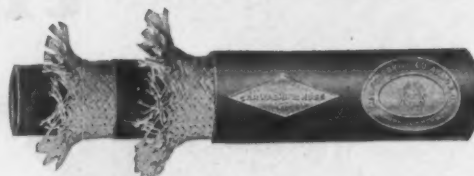
The Pride of Possession

If your top looks well your whole car carries a certain dignity and attractiveness that an ordinary top will never convey. Years of practical experience are back of IDEAL DRIDEK and we emphatically state that this new pebble grain on our particular fabrics make an auto top that is without competition.

Experts Are Strong in Praise of Ideal Dridek

We solicit trial orders from manufacturers and jobbers.

L. J. MUTTY COMPANY
Boston, Dept. C Mass.



A special hose that does general duty

Goodrich Car Washing Hose is not only flexible in its construction but flexible in its uses. It is the all 'round service hose for the busy garage.

Goodrich Car Washing Hose

—washes cars. It turns and twists to all parts of the car without kinking. The flow of water is always free and the hose is always flexible.

—cleans the garage. Strong, sturdy, wear-defying, this hose can be stepped on, driven over, dragged over cement and gravel—and stand the wear. It can be used inside and outside the garage, wherever you use water.

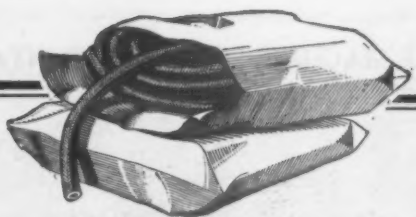
—sprinkles drives and lawns. Goodrich Car Washing Hose is of standard construction—will fit home threads as well as garage. A water hose for every use and long wear.

Your nearest Goodrich Branch has one ready for you—immediate delivery.
Order today.

THE B. F. GOODRICH RUBBER COMPANY
Akron, Ohio

GOODRICH

Car Washing Hose



Goodrich Cable Sells Fast!

Goodrich Starting, Lighting and Ignition Cable has a greater selling attraction than any automotive cable on the market.

It is sold in handy coils of 100 ft. each—carefully packed in dust-proof packages and properly marked for quick sale. And Goodrich Cable is just as good after years of service as the day it was first installed. This makes a big hit with fault-finding motorists.

JOBBER: You will find our Special Jobbers' Plan of special interest. Write for details and descriptive data or samples.

The Goodrich-Lenhart Mfg. Co.
36 Pine Street Hamburg, Pa.

Goodrich Cable

Starting—Lighting—Ignition
Formerly M.P. Cable

100-ft. lengths are popular with the average buyer and convenient for the dealer to handle. This method of merchandising holds a big advantage over the old-fashioned way of selling cable from bulky, dirt-collecting reels of a thousand feet or more.



There Is None Better For Your Customers

Rie Nie dealers are Rie Nie Boosters. They use Rie Nie Patch in their own shop and recommend them to their car owner customers knowing that there are none better.

Rie Nie Patch pays you a good profit—making it profitable for you to use and sell them. When applied, Rie Nie Patch is as secure and lasting as a vulcanized patch. Just show it and people will buy! Two sizes, 50c and \$1.00, fabric backed or all rubber.

Special Dealer's Discount and Advertising Offer!

With every order of six dozen Rie Nie Patches (mixed as you desire) you get an additional discount, the beautiful colored Rie Nie window display, also your name and address neatly printed on the front of each can.

Ask your jobber or write to us for complete information and attractive dealer's proposition.

Durkee-Atwood Co.
Minneapolis, Minn.



Rie Nie
Trade Mark Reg.
PATCH



Our Improved Starter Gears

Only by maintaining the highest quality and striving constantly to improve Huetter's Fly Wheel Starter Gears, have we been able to hold our lead in the field.

We are now offering a high carbon steel, hand forged gear that will last the life of any car. Its latest improvement is in the design of the teeth. This new design makes possible a fool-proof installation, as it meshes properly regardless of which side the starter pinion enters. Thus, too, it reduces the number of gears necessary for a complete stock. It also makes for a smoother meshing of the gears which means no locking, less wear and less noise.

If your jobber can not furnish you with Huetter Gears, write to us direct.

Let Us Send You Our Catalogue

Huetter's

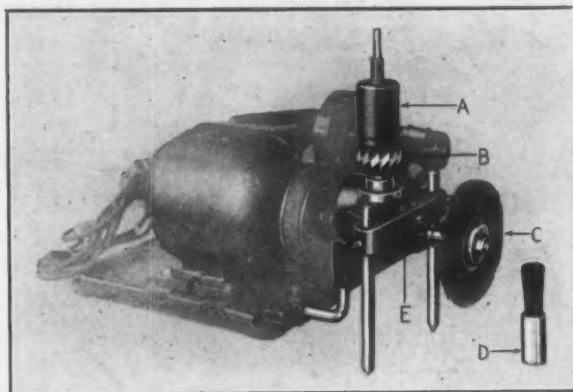
Fly-Wheel GearBands

Huetter Machine & Tool Co.

545 Kentucky Ave. Div. A

Indianapolis

A LITTLE MACHINE SHOP SELF-CONTAINED



Do your reseated valves have factory finishes?

BESIDES grinding Valves with a *mirror finish* and re-sharpening Valve seat reamer at the *correct* angle, this portable machine is arranged to use various attachments.

For Buick Service (see illustration) note the arrangement for re-seating the valve cages by power. Simply place the reseating tool in the holder, place the cage over the pilot, a few seconds, and a seat without chatter marks. Note the wheel brush for cleaning the car-

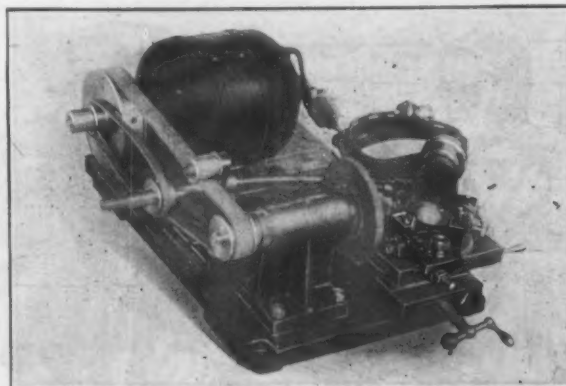
bon from the valve and the end brush for inside the valve cage.

The attachment for ignition points, breaker arms and screw contacts (illustrated below), the machine is always set up and ready for service. You simply insert the holder in the chuck and in less than one minute they are as good as new.

Your jobber can tell you all about it, and we will be glad to. There is a distributor near you.

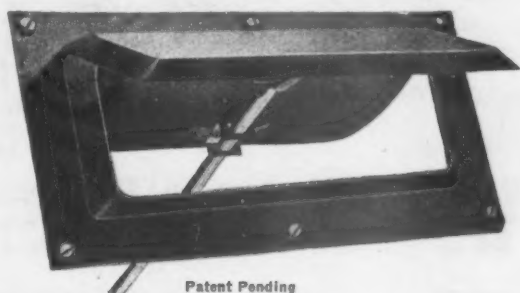
The Franklin Universal Valve and Cutter Grinder

Manufactured by
Franklin Machine & Tool Co.
Springfield, Mass.



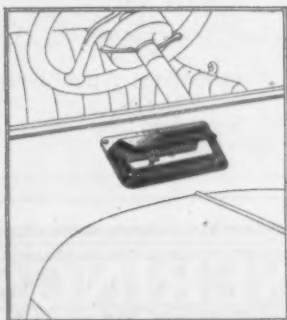
THE UNIVERSAL MOUNTABLE VENTILATOR

A breeze where you need it.



Patent Pending

Announcing



A
MOUNTABLE
VENTILATOR

that can be installed by any
car owner in twenty minutes

The flexible base flange can be made to conform to the shape of ANY cowl.

The cover opens or closes INSTANTLY, operated by a push or pull on the left lever which projects below the instrument board. No hole is required through the board.

The ventilator is dust, air and water-tight when closed. Designed to put the air down onto the floor-board, so that it drives the heat from the feet of occupants of the front seat.

Tools and complete instructions for installing are furnished with each Ventilator, packed in a neat box.

Retail Price \$3.00 Complete

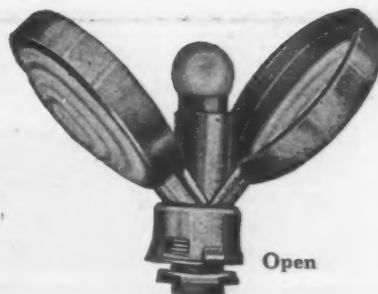
Dealers:—Order one dozen and get started on sales. We will send descriptive literature and a very attractive counter display card on which a Ventilator may be mounted with this first order.

JOBBERS:—Write for quantity prices and terms.

THE HIGBEE-ORNE COMPANY
New Britain, Connecticut, U. S. A.

LOOKING FOR FAST SELLERS?

Here's one—Make room for it on your counter and see how it goes!



Open



Closed

ALLAN PARKING LAMP

Something new in parking lamps—An accessible one from which you can easily remove the bulb and replace it, and which makes a convenient socket for the trouble light.

The Allan has full 2 1/8 inch unbreakable lenses. It's easily seen.

Made of heavy brass, triple nickel plated it is a beautiful device which adds to the appearance of any car.

It is practically unbreakable. The retail price is \$3.00 complete packed one in a box —100 lamps to the case.

Ask for the discount details.

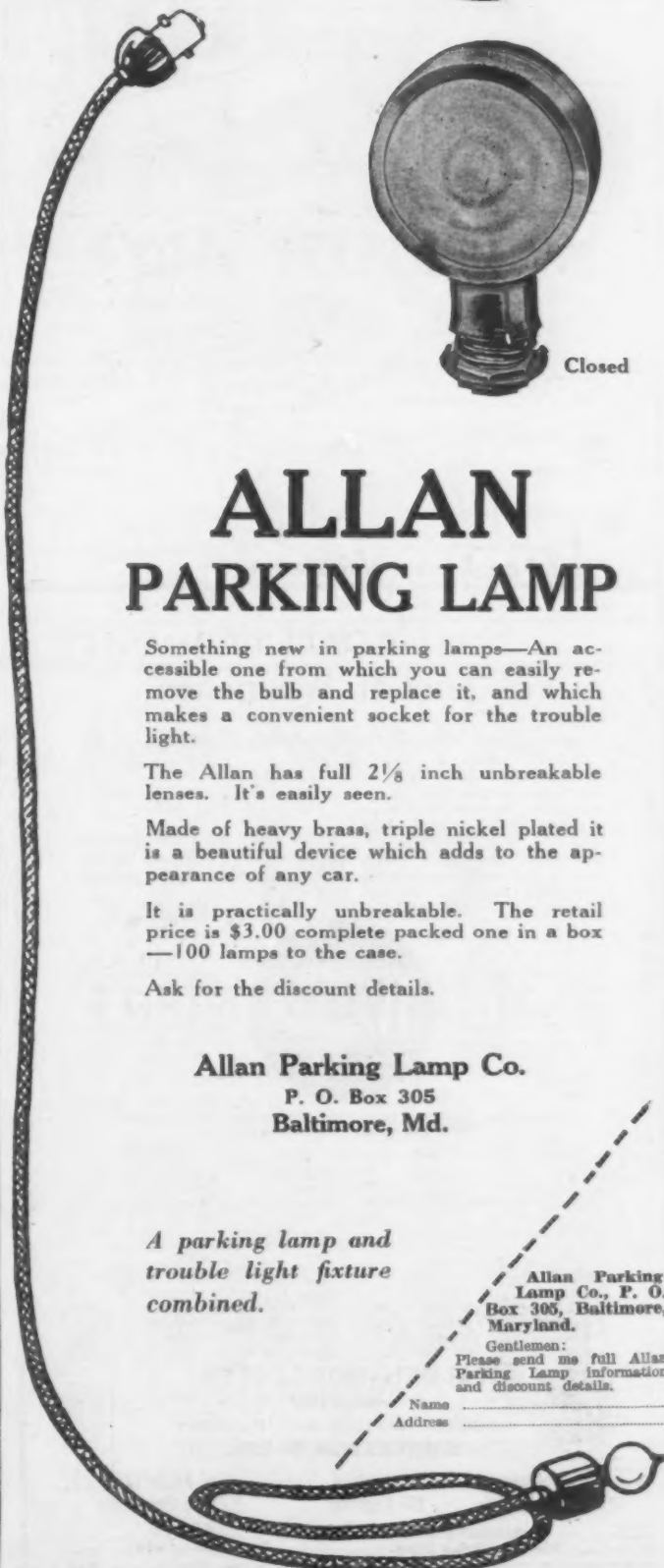
Allan Parking Lamp Co.
P. O. Box 305
Baltimore, Md.

*A parking lamp and
trouble light fixture
combined.*

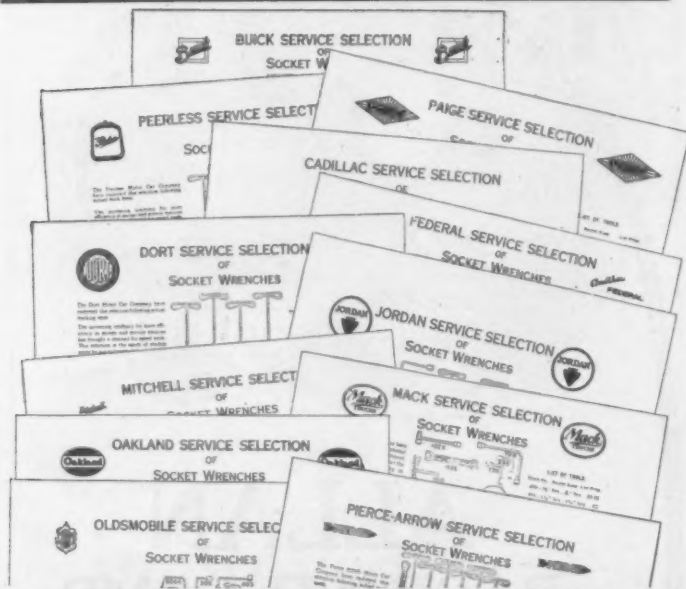
Allan Parking
Lamp Co., P. O.
Box 305, Baltimore,
Maryland.

Gentlemen:
Please send me full Allan
Parking Lamp information
and discount details.

Name _____
Address _____



There's a particular Walden-Worcester Socket Wrench for each particular part of each particular car.



Service Selections of Socket Wrenches

They Simplify Wrench Buying

In making each of the forty-nine service and owner selections Walden-Worcester engineers have worked right with the factory service departments and each selection is the result of exhaustive tests and has the full

endorsement of the company for which it was made. (Note the lists below.)

This not only puts wrench buying on a sound basis, but insures the right wrench for every nut.

You will find it worth while to investigate the Walden-Worcester Service and Own-



er Selections of socket wrenches. Your jobber can ship them from his regular stock.

There are Walden-Worcester Selections of Socket Wrenches on the following:

CARS		TRUCKS	
Buick	Franklin	Oakland	Commerce
Cadillac	Grant	Oldsmobile	Federal
Chalmers	Haynes	Overland	Ford
Chandler	Hudson and Essex	Paige	G. M. C.
Chevrolet	Hupmobile	Peerless	H. C. S.
Cleveland	Jordan	Pierce-Arrow	International
Cole	Liberty	Reo	Mack
Dodge	Lincoln	Scripps-Booth	Pierce-Arrow
Dort	Marmon	Studebaker	Reo
Essex and Hudson	Maxwell	Stutz	Republic
Ford	Mitchell	Wills St. Claire	Selden
Fordson Tractor	Nash	Willys-Knight	Stewart
		Winton	White



WALDEN-WORCESTER
Incorporated
GENERAL OFFICES AND FACTORY
WORCESTER, MASS.

CHICAGO
452 Monadnock Bldg.

NEW YORK
295 Broadway

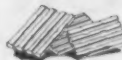
SAN FRANCISCO
707 Monadnock Bldg.

WINNIPEG
Sterling Bank Bldg.

TORONTO
Richardson Bldg.

Send for Free Booklet!

On Storage Battery Tests



BUCKLED PLATES are detected by Allen-Bradley test set without opening battery, avoiding recharge of dead cells.

ROTTED SEPARATORS will show up with the Allen-Bradley test in a manner that avoids any chance of argument.

DOPED ELECTROLYTE is easily found with the Allen-Bradley test. Your hydrometer tells only half the story.

SEDIMENT in battery jars is a common cause of trouble found in a moment with the Allen-Bradley battery test set.

LOOSE CONNECTORS cause serious trouble. Avoid trouble and loss of time by testing connectors with the Allen-Bradley test.

CRACKED JARS are detected with an Allen-Bradley high-rate discharge test. Booklet describes test set and copyrighted battery test chart furnished with set.

Allen-Bradley Co.
Electric Controlling Apparatus

281 Greenfield Ave.
Milwaukee, Wis.

Manufacturers of graphite rheostats for twenty years.

GUARANTEED APEX INNERINGS (INSIDE PISTON RINGS)

STOP Oil Pumping Piston Slap

SAVE re-grinding. To make motors run like new, install an Apex Innering under each ring. Rings will then wear STRAIGHT on face (not OVAL). Apex Innerings stop slap, eliminate oil pumping, increase power, save gas and oil.

RETAIL 30c EACH

up to $\frac{3}{4}$ " wide or 5" diameter (larger, 50c). All sizes. Easily installed. Guaranteed to keep resiliency. Order complete sets. Give year, car name, model, size of rings. Buy or sell no substitute.

THOMSON-FRIEDLOB MFG. CO.

Peoria Dept. C Illinois
Chicago Branch: 2332 S. Michigan Ave.

Canadian Distributors
Bowman Bros. Ltd.

Regina & Saskatoon, Sask., Canada



Don't buy any Innering without seeing our Guarantee Tag. Make sure what you buy looks like this.

Genuine Apex Innerings are fully covered by United States Patents.

It Is Heat—Not Wear That Spoils A Piston Ring



Trade Mark

STEEL BLUE PISTON RINGS

Are Unaffected By Any Heat Action Up to 700° Fahrenheit—
300° Hotter Than They Will Ever Get in a Motor

To every automotive engineer it is a fundamental fact, that it is heat, not wear that spoils a piston ring. Piston Rings do not wear out, they warp, lose their tension and often break thus causing leakage and loss of power, solely as a result of heat.

HETE-PRUF Rings can be in no way affected by motor heat, for they are first formed to true circles having the correct amount of wall pressure uniformly distributed and then heat treated by our patented process which makes them proof against any heat action up to 700°—300° hotter than they will ever get in a motor. Other rings begin to deteriorate at 200° Fahrenheit.

HETE-PRUF Rings are absolutely guaranteed to retain their true circular form, uniform wall pressure and tension throughout the life of the motor.

Write Our Sales Department for Circulars and Prices

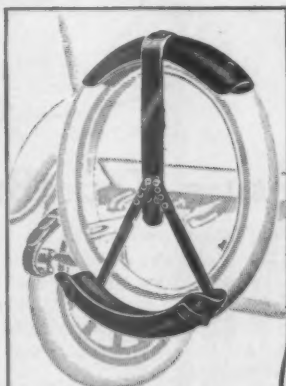
Manufactured by
Leeseberg Machine & Manufacturing Co.
Fostoria, Ohio

Sales Department
The Zinke Company
1315 Michigan Ave., Chicago, Illinois

A Product That Meets a Need—Not a Fancy



Model S



Model Y

Every Motorist
Carries a Spare Tire
Wise Ones Carry . . . **2-R-3**

2-R-3

TIRE CARRIER

MORE motor trips are marred by tire trouble on the road than by any other cause. Why? Because most motorists carry only one spare tire and when that goes out of commission, they are right up against the unpleasant job of trying to fix it themselves or in the case of a blowout are forced to walk back to the nearest garage, perhaps in the rain or the boiling sun.

Carrying 2-R-3 spares is the one and only way of safeguarding against this unnecessary grief—But most cars are only equipped to carry one spare tire.

2-R-3 Tire Carrier solves the problem of enabling the motorist to carry as many spares as he needs.

Selling the motorist a 2-R-3 Tire Carrier, who has experienced trouble on the road requires no arguments. The motorist who hasn't is easily and quickly convinced.

Motorists are quick to appreciate its simplicity of attachment. 2-R-3 Tire Carriers require no tools to attach, there are no bolts or nuts to bother with. They simply hook on the preceding tire and fit every original tire support on the market.

Remember that for every 2-R-3 Tire Carrier you sell, you not only make one nice profit, but open the way for 2-R-3 other sales, a tire, a tube, a rim, and a tire lock.

Made in two models, "S" and "Y." Priced from \$2.50 to \$7.00.

If your jobber cannot supply you, write us direct.

INTERNATIONAL STAMPING CO.

406 N. Leavitt Street

Chicago, Illinois



Eliminates Vibration From The Steering Wheel

Steerite takes all the jars and jolts out of rough roads when it is attached to a Ford car. It sets an invisible straight track for the wheels to follow.

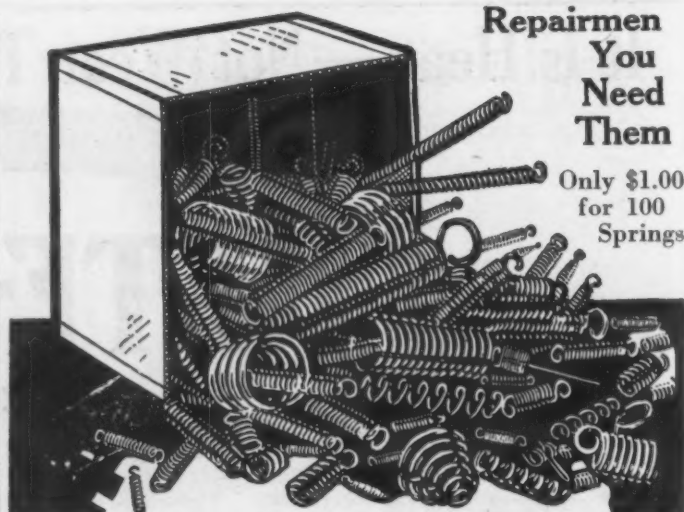
Steerite relieves that constant strain and effort on the part of the driver to keep the car on the road. It also enables the one driving to be more watchful of surroundings because the car is more self-steering.

Retails For Only \$3.50

Thousands of Steerites now in use. And remember it sells the year-around. We have an interesting selling proposition for distributors who have a live selling organization; protected territory given. Dealers write for literature.

Distributors: Wire or write for Sales Proposition. Steerite is the heaviest selling Ford necessity on the market and will make money for you.

Steerite Stabilizer Company
Insurance Exchange Bldg.
Philadelphia, Pa.



Peck's Assorted Springs

are indispensable in every garage and repair shop. Every day or so you may need one or more spiral springs on some job. It's worth time and money to have this assortment right where you can pick out what you want.

THERE ARE DOZENS OF PLACES WHERE PECK SPRINGS FIT IN

Brake repairs, latch springs, choke valves, cutouts, carburetors, magnetos and generators, etc.

This assortment has over 100 brass and steel compression and extension springs in it. Sell four and you pay for the box.

Your own experience will give more "reasons why" you should stock Peck's Assorted Springs.

Send a dollar to-day with your order.

Prices Net to dealer
\$1.00 per box.
Jobbers: Write for quantity discounts.
Send Your Order Now!

THE PECK SPRING CO.

Plainville, Conn.

Manufacturers of Coil Springs for Every Purpose

WHAT BEN ORTH DID—You Can Do!

When Ben Orth of St. Joseph, Missouri, first asked us about the International Radiator system, he was a "doubting Thomas." NOW see what he says:

"My four men worked every night until ten o'clock since the week before Xmas. Last month I repaired and recored 225 Radiators, representing over \$1500 in business. While others are harping hard times, the International way is helping me get a lot of profitable business."

How does he do it? Write and ask him what he thinks of the International Radiator plant. He'll be glad to tell you. Or—

Ask us. We will give you complete information as to how you can do in your own town what Ben is doing in his. Write Ben or write us today and get started on \$3000 to \$5000 a year for yourself!

INTERNATIONAL RADIATOR CO.
3028 Main St., Ottumwa, Iowa



INLAND

1 PIECE PISTON RINGS



Insure Your Business Success

EVERY time you sell or install Inland Piston Rings, you know they will make good. All Inland Spiral-Cut and Oilless Rings are heat treated by the famous Inland process—spring tension is increased and all warp or buckle taken out of the ring before it goes into the motor. Inlands cannot be affected by intense combustion-chamber heat.

SPIRAL CUT

The premier piston ring of America. Patented spiral cut makes it uncoil like a spring with correct tension against every point of the cylinder wall. Equal width and thickness all around—no gap—no weak places.



Stops oil pumping. Bottom oil groove "wipes" excess oil from cylinder wall on each down stroke of the piston; top groove acts as a lubrication pocket. Quick seating insured by "velvet" finish.

INLAND PRODUCTS CO., Inc.

Main Office and Factory, St. Louis, Mo., U. S. A.
Branch Offices and Stocks in Principal Cities

Do You Want to sell an accessory having a quick turnover?

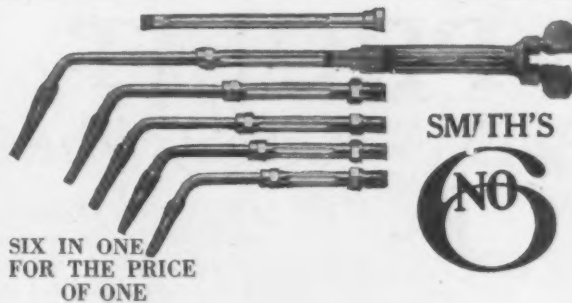


If you do, you'll find the GLOBE Combination Stop Signal and Tail Lamp, type DL-700, a means of increasing your sales and thereby increasing your profits.

Order a quantity from your jobber now.

The Globe Machine & Stamping Co.
Cleveland, Ohio

World's Largest Producer of Metal Tool and
Battery Boxes.



Why Smith Tips Last Longer

There's a fact that every torch user ought to know. It's the way they're made.

Write for this fact.

Address Dept. C

Exclusive
Manufacturers of

**SMITH'S
INVENTIONS
INCORPORATED**

Welding and cut-
ting Equipment

Minneapolis, Minn.

A Live Tip from One Dealer to Another



Frank Rose Mfg. Co.
Gentlemen:—

I find Rose Tire Pumps always lead their line in sales. That's why I carry only the Rose. It is popular in price and always gives the customer complete satisfaction. No use loading up on three or four lines of slow sellers. That's money wasted when the Rose turns so much faster.

(Signed) E. H. Stone

Frank Rose Mfg. Co.

Hastings, Nebr.



Working Day and Night To Supply The Demand. Are You Sharing In This Profitable Business?

FACTORY

33,000 square feet of floor space devoted entirely to the manufacture of Kant-Skore Pistons.

KANT-SKORE PISTONS

Kant-Skore Alloy Pistons, installed at the closest known fit. Maintain constant clearance.

ADVANTAGES

Installed at the closest known fit. Loose fitting pistons are the cause of most motor ills—oil pumping, plug fouling and piston slaps.

DURABILITY

10,000 miles at speeds of over 80 miles per hour on Los Angeles Speedway—an indication of the strength and wearing qualities of Kant-Skore Pistons.

PRODUCTION

10 hour day, and 8 hour night force to meet the increasing demand for Kant-Skore Pistons.

REGRINDERS—REPAIRMEN—DEALERS



Write for our liberal proposition and full details of the Kant-Skore Piston—Established six official A. A. A. World's Records. Use Kant-Skore Pistons and be sure.

THE KANT-SKORE PISTON CO.
CINCINNATI, OHIO

Branches: Kansas City, Mo.; Los Angeles, Calif.

Kant-Skore
PISTONS

WEIGH LIGHTEST · FIT TIGHTEST

PROFIT By Every Greasy Wheel

**STOP
THE
GREASE LEAK**

PAT. NOV. 18 1920



R & R Automatic Grease Retainers make it impossible for grease to leak out of Ford and 4-90 Chevrolet housings insuring clean wheels, tires, brake bands and saving grease.

You should be able to install a set on every car and profit by sale, installation and the good will of satisfied customers.

No Special Tools Required

These retainers formerly retailed at \$1.25 each but now you can sell them at

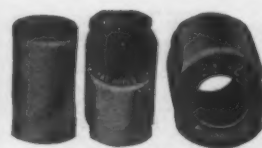
ONE DOLLAR A WHEEL

Or \$2.00 a set of two. Write today for dealer's discount.

THE MACORVEY COMPANY

237 Fourth Ave.

Pittsburgh, Pa.



These Three
Patented Bushings
Make the

EAGLE

**Aligning Fixture
Economical and Fast**

Economical because you can test any bearing up to 2 1/2 inches, with only five extra parts to look after. Fast because you can set the Eagle for any test within its range in a half-minute. The bare arbor fits the Ford's connecting rod bearing.

The Eagle Aligning Fixture shows instantly any bend or twist in a connecting rod. It prevents piston slap and oval cylinders. It forestalls complaints, and makes the customer bring you his other repair work. It makes every overhaul perfect. Send now for an illustrated folder.

Sold by all first class
jobbers.

**Eagle Machine
Co.**

Indianapolis, Ind.



ALWAYS TELLS THE TRUTH

The D-REX-U

Motorists everywhere are demanding the D-REX-U. It gives them double protection. Flashes exact intention of driver to both front and rear. A better signal than the law requires. Easy to operate—easy to install.

Dealers! If you aren't already handling this fast-selling necessity, order today from your jobber, or direct.

Comstock-Bolton Co.
Manufacturers
1931 E. 15th St. Kansas City, Mo.

CURTIS

Single Stage and
TWO-STAGE
Air Compressors

The two-stage compressor with the COPPER INTERCOOLER. Reasonable in cost and built to render a continuous and dependable service. We manufacture a complete line of both single and two-stage outfits. Before purchasing any compressor post yourself on Curtis Exclusive Features.

Write us for full particulars.

Curtis Pneumatic Machinery Company
1527 Klenlen Avenue St. Louis, Mo.
Branch Office:
530-H Hudson Terminal, New York City

Canadian Representative:
Joseph St. Marc
700-A Sterling Bank
Bldg.
Winnipeg, Canada

CURTIS
AIR COMPRESSORS-HOISTS-TROLLEYS-CRANES
ST. LOUIS
C.P. Mfg. Co.
Established 1854

Water Mixed Grinding Compound



'A Better Job in Half the Time'

Why? Because when you grind with *PEP* you're not trying to *grind with grease*.

Grease on a *file* slows down its cutting by *half*. Everybody knows that.

Grease in the old-fashioned grinding compounds slows them down by half too. Many people know that *now*, for they have changed to *water-mixed PEP*.

PEP contains no oil nor grease to lubricate where you *need* friction. *PEP* cannot freeze, dry out, nor rust the can. Our patented formula fixes that. *PEP* will safely stand *double* the usual pressure on the work.

And *one grade* of *PEP* is *all* you need. It cuts *faster* than the "Coarse" and finishes *smoother* than the "Fine" of grease-mixed compounds.

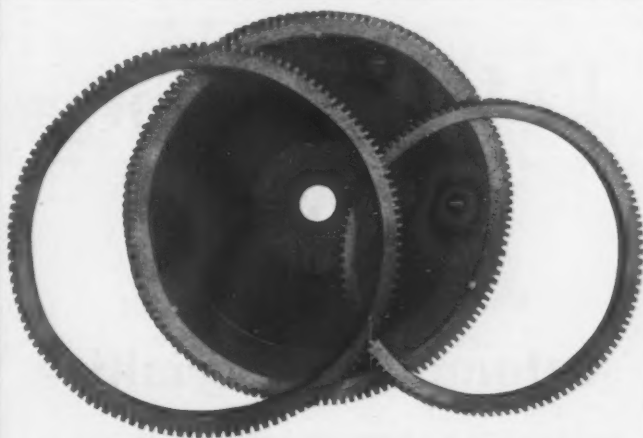
Jobbers or consumers can *prove* this by a postal for free sample to

PEP MFG. CO.

Successors to Worcester Abrasive Co.

33 W. 42nd St.

New York



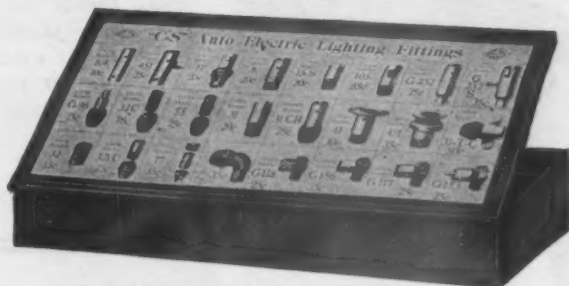
Get Meachem Prices on Fly Wheel Rings

Quantity production of highest quality fly wheel ring gears enables us to quote surprisingly low prices. Write for price list. Ten thousand in stock for immediate delivery.

THE MEACHEM GEAR CORP'N
Syracuse, N. Y.



Display Cabinet



A Sales Stimulator

Keeps the stock clean, making an ideal proposition for dealer and garage man

MADE from steel, spot welded throughout, top lithographed in colors—and with a locking device. Contains a well selected assortment of standard plugs and fittings (136 pieces).

List price, packed for shipment complete with fittings.

\$34.00

If your dealer cannot supply you write us. We will see that you are supplied.

Manufactured by

Culver-Stearns Mfg. Co.

Main Office and Factory
Worcester, Mass.

Sales Agents: J. H. Faw Co., Manuel Bergman, New York City
M. A. Bryte, Inc., San Francisco

New Retail Price

\$3.75

Complete

Easily installed by
any one. Filter auto-
matically cleaned.



Banishes the Dirty Fuel Problem

Car owners always welcome suggestions from you that will help their motor perform more efficiently. When you show them the "Zim" Gas-O-Clean and how it keeps the dirt, scale and foreign matter in the fuel from collecting in the vacuum tank and carburetor, you will make a quick sale and a permanent customer for the service you have given.

The Gas-O-Clean shows at all times just what is taking place within the vacuum system just as clearly as if the entire vacuum tank were made of glass. One of the important features of the Zim Gas-O-Clean is the self-cleaning filter.

B. F. Zimmerman Manufacturing Corp.

257 George St., New Haven, Conn.

Distributors
Wanted

There is big money in this fast selling accessory. Every car owner a prospect. Your territory might be open. Write or wire for Distributors proposition.

**~ZIM~
GAS-O-CLEAN**

Folding Paper Boxes

Make the Ideal Container for
Automobile Specialties

Because they are

Inexpensive • Serviceable
Attractive in Appearance
Save Storage Space

We have solved the delivery problems of others—*Let us solve yours*

Brown & Bailey Company

Franklin and Willow Streets

Philadelphia



Copyright, 1921, Twitchell Gauge Co.

FEED YOUR TIRES

the right amount of air and keep them fed right by using

A TWITCHELL GAUGE

to make sure that they have the pressure that the Tire Manufacturers prescribe.

Price \$1.25 in U. S. A.
Your dealer has them.

This is one of a series of ads now being run in consumer publications to stimulate the sale of Twitchell Gauges. When sending in your order for your season's supply of Twitchells take into consideration the effect of this advertising as well as the fact that there are a million more automobiles in use this year than last.

THE TWITCHELL GAUGE CO.

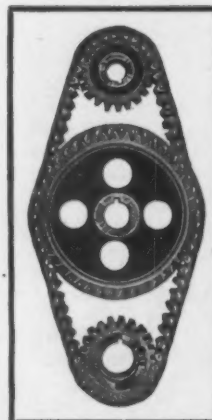
1516 South Wabash Ave.

CHICAGO

OVER 50,000 MILES NOW REPORTED ON "WHITNEY"

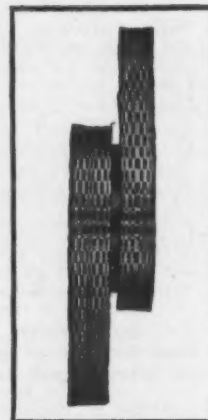
High Efficiency

FRONT END MOTOR CHAIN DRIVES
AND STILL IN GOOD CONDITION



NOT ONE OF
THESE
CHAINS
HAS BEEN
KNOWN
TO SKIP A
SPROCKET
TOOTH

Interchangeable
on the
Sprockets
Furnished with
the Car



The Whitney Mfg. Co.

HARTFORD, CONN.



Rounded steel gears cannot batter. They fit all conditions and insure perfect entering of starter pinion.

Make these profits in your own shop

No need to send away for a new fly wheel when the gears become battered. You can replace the old gears in your own shop—an easy job and profitable. Put flywheel on lathe and turn off old cast iron gears—then heat Logan Ring Gears and shrink on. The job is stronger than ever and in perfect balance with motor.

A size for all cars.

Be the Logan representative in your town.

Ask for details.

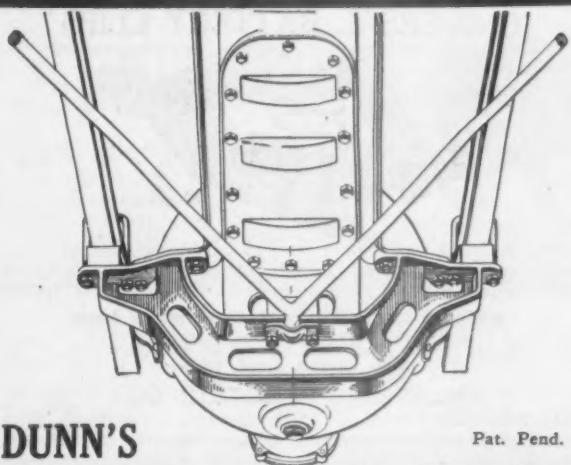
KAUFFMAN METAL PRODUCTS
Bellefontaine, CO. Ohio

**LOGAN FLY
WHEEL
RING GEARS**



**PISTON
PINS**

finished or semi-finished — of a quality to meet exacting requirements. Now offered to the trade.



DUNN'S SUPPORT for FORD MOTORS

Pat. Pend.

The Dunn Support for Ford Motors is a light, powerful girder placed at the point carrying the maximum of road shock and load strain. It relieves and strengthens vital structural parts. In a word, it is a big repair bill saver.

Repair men find broken Ford oil pans almost every day. NO WONDER. This one piece of stamped metal is called upon, in addition to carrying the entire weight of the power plant, to receive the constant pounding of road shocks, the powerful whip-back of the radius rods and the writhing torque twist of

the motor. No wonder these pans of stamped metal break under the strain.

To remedy this is simple. The Dunn Support carries a great share of the power plant weight and absorbs in its powerful body all road shocks. It protects many vital parts of the car against crystallization and breakage. It pays for itself quickly in repair bills saved.

There is a big popular demand for Dunn Supports (also made for Chevrolet 490). They will bring you good profits. Write today for prices and complete information.

DUNN MFG. CO., 103 Main St., Clarinda, Ia.

PEERLESS MICA UNDERCUTTER



Commutator undercutting reduced to an operation as simple as sharpening a lead pencil. Guaranteed to do better work and in less time than devices which support the armature between centers.

Packed for shipment, 6 lbs. Net price, complete, **\$25.00**

The improved Universal Test Bench and 42 other time-savers for service stations are shown in Bulletin M18. Write for it today.

Joseph Weidenhoff

4358 W. Roosevelt Rd., Chicago, Ill., U. S. A.

The Ultimate Way WET INTERNAL GRINDING

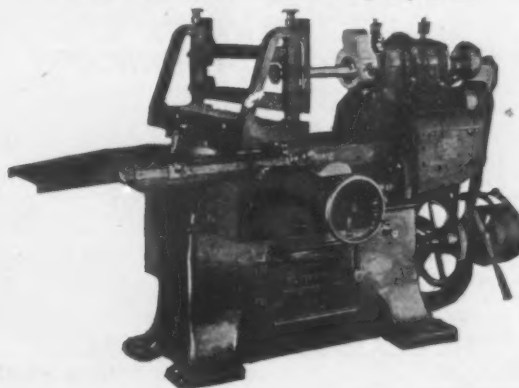
Wet grinding, as made possible by the Micro Internal Grinder, is as far in advance of ordinary dry grinding as the present day automobile is over the old ox team.

Micro

The Micro is a highly developed type of internal grinder adaptable for either wet or dry grinding, at the option of the operator, permitting highest quality of results. Its automatic action, both as to cut, feed and table travel provides the most accurate work humanly possible in exceptionally quick time.

If you're going to get a grinder, get the kind that will pay you biggest returns. Our bulletin gives full information—send for it.

B. L. SCHMIDT CO., Davenport, Iowa



The life of a Battery is doubled
Upkeep expenses
Minimized.

A Homcharged battery lasts longer, never freezes, gives brighter lights and starts your car instantly even in the coldest weather.

THE HOMCHARGER

is absolutely fool-proof—fully automatic—installed and operated by anyone. It cannot overcharge or injure the battery and requires no watching. It lasts a lifetime, and costs less than 1/3 of a cent per hour for maintenance. It will fully charge any motor car battery over night, without removing it from the car, at a cost of but a few cents for current.

DEALERS

There is a nice big profit in this new, easy-selling accessory. Dealers all over the country are selling thousands of these money-makers. Don't Delay—Order Today. Most jobbers can supply you. If not, write direct for a half-dozen or so.

Retails for
Only **\$18.50**

The Automatic Electrical Devices Company
122 West Third St. Cincinnati, Ohio
Branch Offices: New York, Pittsburgh, Chicago, New Orleans,
Los Angeles, Toronto, Dallas, Philadelphia, Baltimore.

A Standard Device Needed in Every Garage

JUST use your air tank and the Branford
Sprayer to

- clean motors
- lubricate springs and running gear
- clean cylinders after removing carbon
- with vacuum tip for cleaning upholstery.

Write for broadside which shows uses.

Order one today. You will find daily uses for it in every part of your shop.

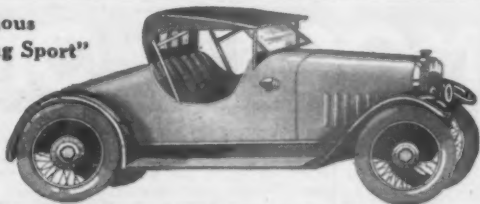
Price \$4 net to Dealers. Vacuum tip 50c extra.

Ask about the New Branford Water Sprayer.

The BRANFORD Sprayer and Cleaner

Made by Malleable Iron Fittings Co., Dept. 46, Branford, Conn.

Famous
"King Sport"



FEDERAL BODIES FOR FORDS

Such as illustrated above is a specimen of the many snappy, comfortable bodies manufactured by us. Equip a Ford or Chevrolet chassis with one of our various designs and notice how easily it sells at a neat profit.

Complete line of speed, sport and touring bodies

The Above Is One of Our Distinctive Designs

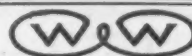
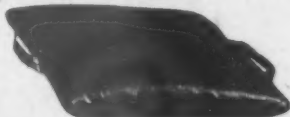
Write at once for our catalogue. Can make immediate shipments. Bodies for Fords as low as \$29.50. Don't pass up this opportunity. Big cut in prices.

Federal Motor Supply Co., 1421 Blue Island Ave., Chicago
Canadian Distributors: Auto Body Co., Toronto, Ont., Federal Auto Body Co., Campbellton, N. B.

Ask Tall Men to Buy "American" Cushions

They will, because "American" Cushions give them that extra inch or two of leg room that gives so much comfort. "American" Cushions are made in any shape to order. Standard shapes shown. Prices very reasonable. Filled with Resilio pure curled hair compressed by tons to proper shape. Non-conductor of heat. Paced with non-lumping downy cotton. Long discount. Write now for particulars and dealers prices.

Ottawa Cushion Co.
Ottawa, Ill.



Automotive Assortment Cotter Pins



Conveniently arranged in a durable leatherette covered case. Just the thing for Retailers' pick-up sales, also Garages and Repair Shops.

We manufacture all sizes of Cotter Pins and make a complete line of Auto Assortments in screw-top boxes.

Jobbers, put these in your catalogue.

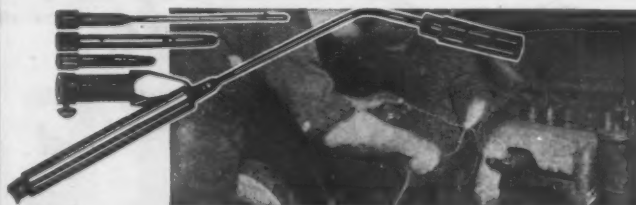
Western Wire Products Co., St. Louis, Mo.

RUB-TEX Compartment Battery Boxes



Rub-Tex Compartment Battery Boxes are revolutionizing the battery industry. Eliminate the old acid eaten wooden box and the fragile hard rubber jars. Positively guaranteed against breaking, cracking, freezing or leaking in battery service for a period of two years. Write now for further details.

Rub-Tex Products, Inc.
Indianapolis, Ind.



PROFITS FROM REPAIR WORK

The latest invention for soldering, sweating, melting, heating, tempering, light brazing, radiator repairing, etc.

TORIT ACETYLENE TORCH No. 13

The handy outfit for the garage and repair shop. Quick, cheap, dependable, and will return to the purchaser in a short while many times its cost.

USES ACETYLENE GAS ONLY

Torch with 4 tips, soldering copper, 5 ft. tubing and connection for auto-acetylene tank \$7.50

Order from your jobber, or
ST. PAUL WELDING & MFG. CO., 169 W. 3rd St., St. Paul, Minn.

Sell This Popular Accessory

Every sale of a Shaler 5 Minute Vulcanizer is more than only one sale and one profit—it brings additional sales from the same customers, because they each need to buy the Patch-&-Heat Units regularly for use with the Shaler. This big repeat business comes to you—brings you regular profits—in addition to your profits from selling Shaler Vulcanizers—and without any effort on your part. Regardless of times or season, Shaler Vulcanizer sales bring steady repeat sale profits. Complete outfit retails for only \$1.50.

SHALER

**5 MINUTE
VULCANIZER**

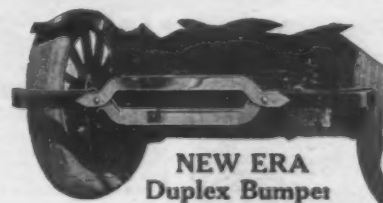
Sold By All Jobbers

C. A. Shaler Co.
224 Fourth St.
Waupun, Wis.



You Can Tell

Look over the bumpers. There are many kinds. You won't find any that are built for greater protection or that are better looking—if as good—as NEW ERAS. They give the buyer a shade the best of it on price; and they are the ONLY permanently guaranteed bumpers on the market. So we suggest NEW ERAS offer you a good opportunity. Write for catalog and terms.



**NEW ERA
Duplex Bumper**

NEW ERA SPRING & SPECIALTY CO.

70 Cottage Grove Ave.

Grand Rapids, Mich.

DUTY MOTOR TRUCKS

TWO
TON

\$1590
F O B
FACTORY



Standard Specifications

Low in initial cost and upkeep; big in service. Duty Trucks have built up good truck business for every one who handles them. They handle 90 per cent of all hauling requirements. Ask for literature and details of our profitable selling plan.

Elgin

DUTY MOTOR CORP.

Illinois

REPAIR MEN: WHEN? WHERE? HOW?

is time lost, misused, or wasted in your garage?

Eight
Combinations
of names
and numbers

Tamper-proof
lock base

Automatic
Change from
A. M. and
P. M.

Shock-proof
action

Dustproof and
Guaranteed
Accurate



The Automatic Time Stamp

shows by records that are accurate, helpful, and money-saving, just how long any job takes. Makes more production and repair work possible, and puts full measure into each working hour. Used by many garages. Forty years' success.

Write for folder today.

THE AUTOMATIC TIME
STAMP CO.

163 Congress St., Boston, Mass.
"Originators of the Art of Printing
Time Automatically."

Many models with
wide range in prices.

TRADE SNAPPY ABC BODIES MARK



Would you believe
this to be a Ford?

1922 Models Ready
for
Ford, Chevrolet 490,
Dodge, Maxwell 25,
Saxon 4, and Over-
land Nos. 90 and 4.

Dealers Wanted
By equipping used
chasses with A B C
Bodies, you can make
as high as 100%
profit.

Send for Catalog
No. 16



ABC Racing Body

AUTOMOTIVE BODY COMPANY

Dept. 217—549 W. Washington Blvd.

Chicago, Ill.

SMOOTH-ON

TRADE MARK REG. U.S. PAT. OFF.

An Accessory That Sells! Why?

SMOOTH-ON, for Leaky Radiators



Because every motorist wants Smooth-On just as soon as he learns how quickly, easily and economically it repairs leaks, cracks or breaks in radiators, radiator-edges, water jackets, pumps, etc., from the outside, without removing the radiator. Smooth-On makes a repair that will outlast the life of the radiator in many cases. Here's an opportunity for dealers to increase their profits. Write for proposition.

Garagemen: Write for literature "A"—it means more profits for you.
Smooth-On comes in 6 oz., 1 lb., and 5 lb. tins. Also in larger sizes.

SMOOTH-ON MFG. CO.

Est. 1895.
JERSEY CITY, N. J.

Ride Easy with HOO-DYE (HOUDAILLE) HYDRAULIC SHOCK ABSORBERS

Standard Equipment on Leading
European Cars

The HOUDAILLE CO.
1402 West Ave. BUFFALO, N. Y.
M'd by The Houde Engineering Corp.

BURD Piston Rings

EXCEL IN SERVICE AND EFFICIENCY

Sold by All Jobbers

BURD HIGH COMPRESSION RING CO., ROCKFORD, ILL.



Lycoming MOTORS



Fours exclusively—highly developed

LYCOMING MOTORS CORP., WILLIAMSPORT, PA.



ROCK-A-BYE AUTO SEAT AND BABY CRIB

Profitable Items for Auto Accessory Dealer

Dealers will find the Rock-A-Bye Auto Seats and Baby Cribs ready sellers. Women motorists throughout the country know the famous Rock-A-Bye line of nursery specialties and will be quick to see the advantages of these popular items.

The Auto-Seat is made of durable gray material and steel frame. Collapsible. Straps to automobile seat. Can also be used as high chair. Retail price \$5.00.

The Baby Crib is made of durable gray material, on a collapsible steel frame. Entire crib can be put under auto seat with ease. Mighty handy for motorists. Retail price \$6.00.

Display these items and watch results. Send for satisfactory dealer terms.

Perfection Manufacturing Co.,
2718 N. Leffingwell Ave., ST. LOUIS, MO.

Dealers or by Mail



STEVENS TOOLS

SPEED
UP



OVER 50 WONDERFUL SHORT CUTS
IN NEW CATALOG T-105

ASK FOR IT

STEVENS & COMPANY
375 BROADWAY, NEW YORK

SEE PAGE 5

E-C-L Pistons

ALUMINUM ALLOY NON EXPANDING



How to Eliminate Piston Slap

Piston Slap is a common and vexatious cause of engine trouble which in the past has bothered most car owners.

But it can now be eliminated.

With the E. C. L. Aluminum Alloy Non-Expanding Piston. E. C. L. Pistons may be fitted with a closer degree of clearance than cast iron pistons. They reduce the consumption of gas and oil—Increase power and speed and eliminate spark knocks.

Let us tell you more about this remarkable piston. Write for the details today.

E. C. LONG

Main Office and Factory

4834 Beaubien Street

Detroit, Mich.



THRUST BALL BEARINGS

of all types used in airplane construction.

THRUST BEARINGS manufactured to your requirements.



The Bearings Company of America

Lancaster, Penna.

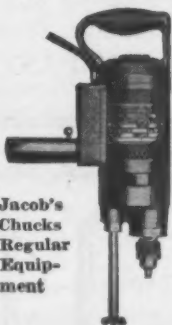
Detroit, Mich., Office: 1012 Ford Bldg.

THE PIONEER

Garage Special Electric Drill and Valve Grinder

"It will do the work"

Jacob's
Chucks
Regular
Equip-
ment



The handy, light weight tool that's indispensable to every garage and repair shop. Write now for full description and price.

Louisville Electric Mfg. Co.

Incorporated

Louisville, Ky., U. S. A.

C. E. Willey, Pres. J. B. McFerran, Secy.-Treas.



Genuine Leather FAN BELTS

Now you can get genuine leather fan belts for as low prices as inferior substitutes. And remember, real leather belts will sell faster, make you better profits and more satisfied customers. No wonder our Group Fan Belt Assortments are especially popular among dealers this season!

Ask your jobber's
salesman for full par-
ticulars, prices and
discounts.

HIDE, LEATHER & BELTING CO.

Detroit
Evansville

INDIANAPOLIS

New York
Memphis



Johnson Gas Torch

Better than gasoline blow-torch for bench work, operates with one hand. Uses any kind of gas. More efficient, less risk. Use it for tempering carbon steel; preheating for brazing; sealing batteries, shrinking collars—a hundred other uses. Requires no forced air blast.

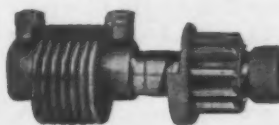
A big dividend-payer at \$4.50

Send for catalog of Johnson Gas Appliances for garage and service station use.

JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA



for ELECTRIC
STARTERS



AUTOMATIC ENGAGING
& DISENGAGING

**194 Motor Car and
Truck Builders
Use It**

ECLIPSE MACHINE CO.
ELMIRA, N. Y.



High Torque Motors

Positively superior in economy and durability because it maintains its greatest pulling power at average speed.

Built upon a principle that years of most strenuous tests have proved right. The "buy word"

of thousands of tractor men is

"Waukesha." Manufactur-

ers, write us. There's a

Waukesha to suit your

needs.

Write
for Complete
Information

Waukesha
Motor Co.
Waukesha,
Wis.



**100%
Right**

All You Need to solder Aluminum

A Clean soldering iron and a bar of
EVERSTICK ALUMINUM SOLDER

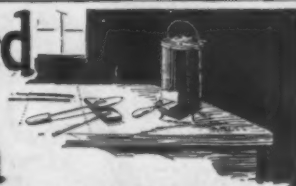
No Flux Necessary

Price \$2.50 a Pound—Delivered

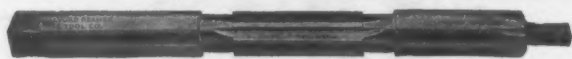
Trial Bar 50c Postpaid

Order TODAY From

GREAT WESTERN SMELTING & REFINING CO.,
3108 N. Broadway St. Louis, U. S. A.



ALVORD QUALITY TOOLS



Taps, Dies, Cutters, Drills, Reamers
Send for Catalog
ALVORD REAMER & TOOL COMPANY
Millersburg, Pa.

KISSEL
Custom Built
Six

THE ARISTOCRATS
OF MOTOR DOM

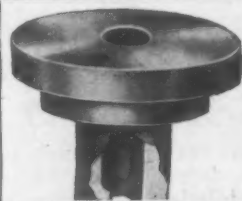
6 Models—Open and Closed

Distributors in principal cities
Open territory now being closed

KISSEL MOTOR CAR CO.

Hartford

Wisconsin



HOERNER REAMER GUIDE

Accurately centers reamer, doing away with need for re-cutting valve seat to bring in line with reamed guide hole. Mailed postpaid in U. S. Ford and Chevrolet, \$1.25. All others, \$2.00.

HOERNER MANUFACTURING CO.
3929 Moneta Ave., Los Angeles

THAYER & BOWER
Western Distributors

San Francisco Denver Los Angeles Portland



Trade Mark

For All Cars and
Trucks

Write for Catalog and
Prices

National Spring Co.
Newcastle, Ind.

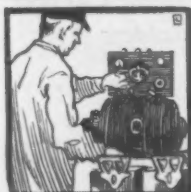
REPLACEMENT PISTONS

Same weights, metals and machining as original equipment—no features or departures from motor manufacturers' specifications. Eliminate uncertainty by replacing with the same kind of pistons as furnished with the original job. Jobbers: A most unusual proposition awaits your request for details. Write today.

OHIO PISTON COMPANY

5337 St. Clair Ave.,

Cleveland, Ohio



\$20 Brings You An HB Charger

Balance on easy monthly terms. You can make \$150 to \$300 clear profit each month with an HB outfit. Sizes for 6, 10, 16 or 32 batteries. Free trial on money-back guarantee. Busy season just starting. Get ready for BIG PROFITS. Equip your shop with money-making HB Battery Chargers, Motor Grinders, Automatic Air Compressors, Ball bearing Electric Motors, Lighting Generators. All big money-makers. Sold on easy payments. Write for information. HOBART BROS. CO., Box AR 53, Troy, Ohio.



Floating Spring
Comfort for
Chevrolet Owners

Marvel Silencers Stop All
Noise of—Taps—Steering
Wheel and Gear Shift Lever

FOR
CHEVROLET 490

MARVEL
SHOCK ABSORBER

MARVEL SHOCK ABSORBER CORP.
1250 W. 76th St., Cleveland, Ohio

Kokomo
LONG-LIFE
TIRES AND TUBES

KOKOMO RUBBER CO., Kokomo, Indiana
131 South Main St.

Kokomo Long Life tires and tubes make money for dealers who handle them.

Kokomo Twin-Grip Fabrics
Kokomo Twin-Grip Cords
Kokomo Everlast Red Tubes
Kokomo Standard Gray Tubes

Strom
BEARINGS



All types and sizes of radial (single and double row), thrust and angular contact bearings. Write us for further information.

U. S. BALL BEARING MFG. CO.
4551 Palmer St. (Conrad Patent Licensee) Chicago, Ill.



MILES
ONE-PIECE TRIPLE SEAL
PISTON RING

Trade Mark Patented—Other Patents Pending
Requires no fitting or filing—exerts even wall pressure—has an overlapping seal instead of an open joint. Write for literature and sales proposition.

Distributors in 33 Large Cities

MILES PISTON RING CO., Chicago

Factory and General Offices, 5345-5353 S. State St.



SAY "W. & C."

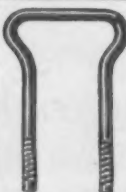
and Your Jobber Will Give You the
Most Successful

Time-Tried Shock Absorber for Fords
W. & C. Shock Absorbers Sell

P. H. WEBBER COMPANY

Hoopeston

Illinois

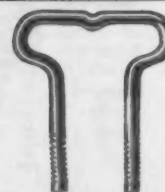


1 or 1,000,000
Beehler

Battery Handles

Reduced Prices
All Styles

Beehler Steel Products Co.
St. Louis, Mo.



TRIPLEX
GASOLINE HOSE

Every Length Guaranteed for 1 Year's Service

Metal Hose & Tubing Company

Main Office and Factory, 235 Tillary St., Brooklyn, N. Y.

Branches: Chicago, Los Angeles, San Francisco

Reaches the corners

the All Purpose Wrench

Onli-1
WORKS ALL-WAYS

6 Extra Sockets
SOCKET WRENCH

KING TOOL CO., ASBURY PK., N. J.

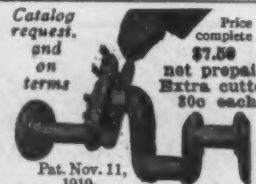


ATLAS GARAGE TOOLS

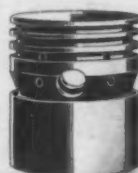
Crankshaft Grinder (Standard) for
crankpins 1 3/16 to 3 1/4 in. diam.
formerly \$10.00, now \$7.50
Crankshaft Grinder (large) 3 to 4 in.
formerly \$25.00, now 12.50
Crankshaft Grinder (for Fords) 5.00
Garage Unit, formerly \$85, now 20.00
Garage Press 20 Ton 25.00
Bearing Compound 1.00

Send for free sample of compound.
ATLAS MANUFACTURING CO.
Millvale Sta. (Dept. H) Pittsburgh, Pa.

Catalog
request,
and
on
terms



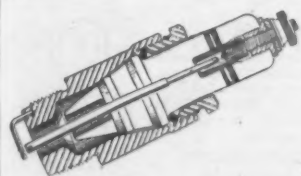
Pat. Nov. 11,
1919



**DOUBLE SEAL
OIL-CONTROL-PISTON**

This hook-shaped groove catches the excess oil and returns it to the crankcase through holes in the bottom of the groove. Oil troubles are unknown with this piston. Used by many car builders as standard equipment. Write for our dealer proposition.

Double Seal Ring Company
Gen. Sales Office, 2335 S. Michigan Ave., Chicago



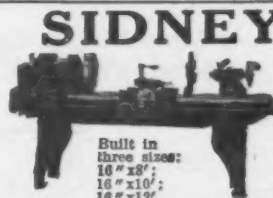
DURO
SPARK PLUG
Easiest to clean
 Write for liberal trade discounts.
DURO COMPANY
 96 N. 15th Street, East Orange, N. J.



THURO
Lubricates Thoroughly
CLEAN-QUICK-POSITIVE
 THE LARKIN AUTOMOTIVE PARTS CO. DAYTON OHIO



EAGLE
TIMER FOR FORDS
 Builds sales on the solid foundation of satisfied customers. Write
EAGLE TIMER Co., Ridgely, Md.



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About the lathe hinges your entire machine equipment. If it is efficient, versatile and represents a reasonable investment, the quality of your work and YOUR PROFITS are right. Investigate TODAY—NOW. Write. The Sidney Machine Tool Co. Sidney, Ohio

Built in three sizes:
 16" x 8";
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Pedrick
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PISTON RINGS
 Exert an equal pressure on the cylinder wall at every point of its circumference

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TIRE CARRIERS FOR FORDS

All types—rear and side, bracket and cradle. Well made and well finished. All fitted with thief proof locking device. A line of carriers that moves fast and pays a good profit on rapid turnover. Fully described, with prices, in our new catalog. Send for a copy. Prices reduced to the utmost limit for 1922.
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When you find Ames dial gauges in the finest automotive shops, on close limit work — there's a reason. Let us tell you why. Write TODAY.

B. C. AMES COMPANY
 Waltham, Mass.



The Heart of the Ford
 Motor is the

ROTOR

Master
PERFECT-CONTACT
ROTOR

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Brake Lining, Clutch Facings, Fan Belts, Tire Straps, Hood Lacing, Tow Straps, Tabstocker Straps, Emergency Brake for Fords, Transmission Lining for Fords, Non-Chatter Bands for Fords.

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THE RUSSELL MANUFACTURING CO., Middletown, Conn.

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 MACHINES

BORING
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LANDIS

LANDIS TOOL COMPANY

WAYNESBORO, PA.

NEW YORK OFFICE:
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Won't Leak Because They're Sealed With Oil

No-Leak-O Piston Rings are making money for dealers everywhere. Their "oilSEALING" groove—found only in No-Leak-O—packs an oil film in between piston and cylinder walls like "packing" in a pump. Oil and gas stay where they belong. National advertising is helping the dealer sell No-Leak-O by teaching the motorist the lesson of more mileage on less oil and gas. It will pay you to stock No-Leak-O at once. Price 50¢ and up.

NO-LEAK-O PISTON RING CO., Dept. T-57, Baltimore, Md.

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You can reduce them 15% if your car carries a

POMEROY PATENTED ELECTRIC GASAFIER

Start immediately in any weather and save your battery. \$5 buys one. Now entering fourth season.

Special District Representatives Wanted

Pomeroy Electric Co., Inc., Mfrs., 46 E. Main St., Rochester, N. Y.

Save 15% to 40% Gasoline

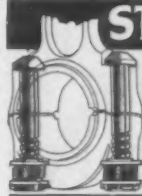
Install Kreitner's Automatic Air Valve, on your Ford and get more miles per gallon and more power at all speeds. Installed by anyone in less than five minutes. No holes to drill. No parts to remove. 30 day trial. Money back guarantee. Postpaid \$4.50 anywhere in the United States. Exclusive territory for live agents.

Kreitner Manufacturing Co.

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Install Kil-Nock Automatic Bearing Bolts and forget having to "take-up" bearings. They build trade, and make good profits. If jobber can't supply, order direct. Set of 8 for Ford, Chevrolet, Overland, etc., \$3.

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The World's most complete line of Automotive Jacks

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JACKS
WALKER MFG. CO. RACINE, WIS.

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Equip your garage for the most profitable work. A Storm Tool for every job. Write for catalog.

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Install one or more units of the Correct Measure Motor Oil Display Pump on your curb. "Make him think of oil." This pump is handsome in design, sturdy, holds 12 gallons. Empty weight 65 lbs. Low center of gravity. Can be rolled to curb in morning and back indoors at night. Delivers $\frac{1}{2}$ gal. in 12 seconds. Price \$45 per unit. Write for details.

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MOTOR OIL DISPLAY PUMP

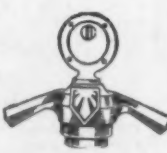
Correct Measure Co., Inc. Rochester, Pa.

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FOR FORDS
Self Locking Radiator Cap

Screws on But Not Off

Guards motormeters against theft and breakage. Cannot be removed without overturning radiator. Brass, highly nicked and polished of special design to harmonize with the lines of the Ford radiator. Priced to suit the Fordowner's pocket-book, it is a lively seller and good payer.

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Twin-Spring BUMPER
FOR FORDS

A better bumper at a better price with Underwriters' Approval

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THE GASKET FOR FORDS WITH THE LEAK LEFT OUT

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How the \$100 Reward Built a Summer Business

Why does the dealer who stocks Jaffe Radiators do a bigger year-round Ford replacement business? In Winter—the \$100 Reward against freezing damage makes the Jaffe Radiator the best seller on the market. In Summer—the dealer who keeps faith with his customers—who sells them year-round service that permanently satisfies—knows that the \$100 Reward is his best ally. Why—because the autolite who buys The Super-Cooling Jaffe in the summer never seeks a new dealer in the winter. Our Book "Building Summer Business the Jaffe Way" each year increases the profits of hundreds of thinking dealers. A postal card brings it to you.


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AIRCO IGNITION GAUGE
The Watchdog of the Ignition System

Instantly detects faulty spark plugs and spots short-circuits and leaks in the high-tension wiring. Of unusual interest to jobbers and dealers. Price, \$1.00.


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In one unit a better instrument for every electrical test

The Plucker Tes-Tor is particularly adapted for garage and service station use. It can be set in the corner on a work bench or taken out on road jobs. It is capable of making practically every electrical test on motor car equipment. Write for literature and details of our descriptive data.

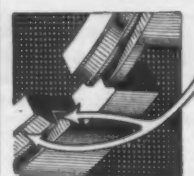
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See the Beveled Edge and Oil Groove of the Universal One-Piece Piston Ring

Forced Lubrication Prevents Foul Plugs. The beveled top edge and central groove keeps oil from the combustion chamber—reduces carbon. Dealers—Write for the details.

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The Combination Mirror and Parking Light—

CLOX-LITE

Liberal Discounts

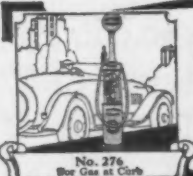
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Factory: Perkasie, Penn.

The Halt Signal — which can also serve as a Parking Light.

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Air Compressors; Gasoline and Oil Storage Systems; Heavy Metal Storage Tanks; Oil Burning Systems; Furnaces and Forges; Oil Filtration Systems; Water Softening Systems.

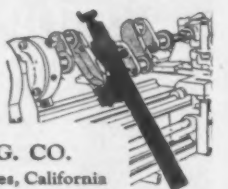
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THE WEBER
Crank-Pin Re-Turning Tool

Re-returns crank-pins quickly and accurately at one setting of the crank shaft in the lathe on centers. A high-grade precision tool.

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H PARKIN, Magneto Attachment

FOR FORDS—has one gear which is in pitch with cam shaft gear—and only one bearing. Integral with cam shaft gear housing insures lubrication from crank case. Get the details.

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BROWN-LIPE-CHAPIN DIFFERENTIALS

Both in Syracuse, N.Y.

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Spohrer ENGINE DRIVEN PUMP and Spohrer ELECTRIC DRIVEN COMPRESSOR

Pumps are made for trucks and cars. Have Standard S. A. M. mounting. From \$25 to \$75. Compressor made in 1/4, 1/2, 1 h. p., small size \$85.

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Sixth Ave. & 13th St.,
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No Springs
No Auto-
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attachments
No adjust-
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Omac constant-unit CARBURETOR

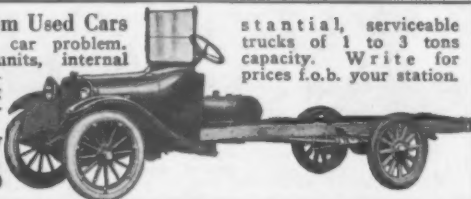
Simple
Positive
mechanical
action.

6 TO 12 CARBURETORS IN ONE
Jennings Corporation, Homewood Station, Pittsburgh, Pa.

Make Trucks From Used Cars

Helps solve used car problem.
We supply all units, internal
gear drive, every-
thing for converting
used cars into sub-

E & W Company
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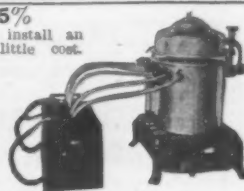
stantial, serviceable
trucks of 1 to 3 tons
capacity. Write for
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New low price (25% reduction) allows you to install an
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Made of material NON-INJURIOUS to the ele-
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STEAMING and battery is ready for dismantling.
Distills about one gallon chemically pure water
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EVERYDAY—the Only Ring That Is Absolutely Locked!

The EVERYDAY Master Lock locks the piston ring Edgewise—
Widthwise—Lengthwise, just like a solid ring. You can't force
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Write now for the Xtra Profit Plan on EVERYDAY Piston Rings.

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SHOCK ABSORBERS  FOR ALL FORDS



Better shock absorbers, not involving changes to
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Price—\$3950 F. O. B. Asbury Park, N. J.

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SERVICE SYSTEM
VISIBLE GASOLINE

The most reliable filling station made.
Will make big profits for you.

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THE SMOOTH POWER OF THE NIGHT DRIVE

The Symbol of Power

EAGLE WING

CARBON ELIMINATOR

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Dealers—Every Ford user in your vicinity knows that his
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the only WORM Steering Gear built for FORDS. Nation-
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"Bulldog" Foot Accelerators for Fords
A live article—in demand because it always makes
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RUBBER COVERED PEDAL
MAT BINDER
NON-SLIP FOOT REST

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For Auto Visors, Wings, Curtain Lights, etc.

Makes Night Driving Safe

against blinding headlight dazzle and prevents sun
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Write for samples of colors.

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MANUFACTURING
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ELECTRICAL
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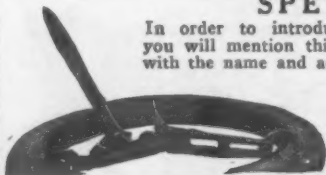
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DURABESTOS Brake Lining

SUPERIOR IN ITS PERFORMANCE—WRITE US
UNITED STATES ASBESTOS CO.
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SPECIAL OFFER

In order to introduce our Red Giant Rim Tool, if you will mention this advertisement and send us \$3.00 with the name and address of your jobber, we will send you by express one of these tools.



Keep it thirty days, and if not satisfactory, return it to us by parcel post, and we will return your money. This offer holds good till June 1, next.
RED GIANT TOOL CORP.
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AN ARM OF THE LAW FAUROT—SCOPE

AN ANTI-THEFT DEVICE FOR MOTOR CARS

The Faurot-scope reduces the cost of automobile theft insurance 15%. Automobiles equipped with the Faurot-scope are immune to the \$25 penalty in force in some localities.

Exclusive, Protected Territory Now Open for Distributors and Dealers.

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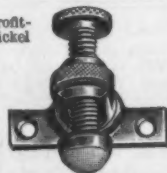
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Do not overlook these live selling and profitable items. The metal is brass, heavy nickel plated and will not rust.



Four styles—one for every car.
No. 503 with the Hump Base.
No. 504 with Ell Base. No. 505
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Packed fifty to carton; five display
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The company that took the rattle
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Lubricator For Fords

Gives the Ford owner high pressure lubrication at a low price. Gun and set of 7 cups, \$6.00. We can furnish the rod and king bolts designed for grease instead of oil. Write for our proposition.

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Snap-on

INTERCHANGEABLE

Socket Wrenches

Sold in the handy kit that makes car owners eager to buy and use them.

SNAP-ON WRENCH CO.,

Motor Tool Specialty Co.

Distributors

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Gen'l Office

Gen'l Offices, 10 So. La Salle St., Chicago

MILWAUKEE, WIS.

CHICAGO

no glare

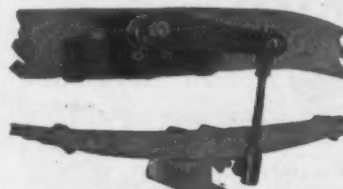
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A curtain that fits on the windshield of every make of car and keeps dazzling lights out of the driver's eyes. Can be lowered or raised at will. Retail for \$2.50.

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More than a Shock Absorber because it fluid-cushions all movements between the body and the chassis—gives a new experience in riding comfort.

Good distribution territory is still to be allotted. For information write to

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50% off on Replacement Parts for Fords
We carry in stock ready for shipment over 400 parts.
Write or wire your order and cash in on this big additional profit. All parts positively guaranteed. Ask for catalogue.
Columbia Supply Company
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EARL THE VALUE of TODAY
MOTOR CAR EARL MOTORS, INC.
Jackson, Michigan



Gill
One-Piece Piston Rings

The Gill Manufacturing Co.
Chicago. Illinois

The ALLEN TIRE CASE

Protects the spare shoe from the deteriorating effects of grease, oil, sunlight and paint. Stylish, useful, adds to any car's attractiveness.

THE ALLEN AUTO SPECIALTY CO.

Makers of the Famous Allen Shutter Front
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WEBSTER ELECTRIC COMPANY
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BOWSER
ESTABLISHED 1885
ACCURATE MEASURING PUMPS

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"Ne'er a worry"
TIRES
FULL OVERSIZE
CORD and FABRIC

The Dealers' Own Tire

A new tire—a new system of distribution for dealers who are seeking extra profits.

Write for our Exclusive Dealers' Proposition

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TRENTON NEW JERSEY

McQUAY-NORRIS
PISTON RINGS
for every Purpose and Price

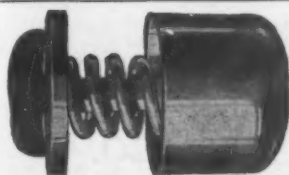


**Perfect Seal
Piston Rings**

Distributors—Good Money

can be made in the new territories now opening for the sale of PERFECT SEAL—the piston ring with the position-retaining shoulder. Write today for our good proposition.

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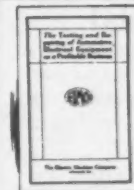
Exact Size—Dealers Wanted

LAMBERT LICENSE PLATE HOLDER

Slip holder through plate, then through bracket, give quarter turn and your plate is on to stay.

No Noise. No Rattle.
Retail Price, \$1.00 per set of four
Write for discounts

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Armored all over against blows and knocks. Covered water-tight against dampness and shorts. Made for any car, truck, tractor or airplane. Excellent opportunity for capable distributors. Send for information.

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"The Rut-Proof Tire"

Only Tire With a Fully Protected Sidewall

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200,000 IN STOCK

The Complete Line

Immediate Service

Catalog A on Request

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COLUMBIA CARBURETOR

Specially designed to handle present day fuel. Pre-heating is a built-in feature. Other lines to be announced. Wire or write for complete details.

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This new socket wrench is something every mechanic has long wanted. Made from selected stock, specially heat-treated and hardened. No other sockets are quite so strong, no other ratchet quite so well made, no other universal quite the same. Care and quality is evident in every unit. Exceptional facilities allows marketing at an attractive price. Write for guarantee.

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WATERVLIET SPIRAL EXPANSION REAMERS



Specially designed for piston pin work on every make of car and truck.

They Will Not Chatter
Give a full bearing surface with a mirror-like surface
Ask Your Jobber About Them
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WANTED! Exclusive Dealers

to handle Grey Goose Shock Absorbers. Easiest riding absorber of all time. Easily and quickly attached. Only 4 bolts to change—requires no special tools—only \$10 for complete set of 4. Liberal discount. Also made for Ford Trucks and Dodge Cars. Exclusive territory being assigned rapidly. Write for Folders and Agency Terms.

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Garages, companies, individuals, stamp your name on your car parts, tools, keys, silver-ware, golf equipment, etc. Insures identification and discourages theft. Each stamp hand engraved and tempered. Write for prices. We make metal stampings to order.

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P.E.D. AUTOMATIC SIGNAL

The P. E. D. Corporation

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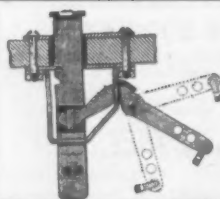
High Pressure Lubricating System
FOR ALL MOTOR CARS AND TRUCKS

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"A MULTI-
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SERVICE UNIT FOR
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Cut-Out Pedal

Operates cut-outs, exhaust whistles, heater valves, working in any direction push or pull. Stroke adjustment quickly made. Operates from toe board or heel board. Retails for \$1.00.

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AUTOMOBILE CLOTHS

for dusting, cleaning & polishing motor cars

(Not a waste product) but a knit from new stock. Put up in convenient cartons. Ask your jobber or write direct.

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Packages— \$1.00
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A Complete Line of Sixes and Fours For 1922

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The Simplest Spare Carrier Made
Bolt and Nut Construction makes attaching
easy and removing both spares simple.
Wrench does work. Complete set sells for
\$3.50. Ask your jobber.

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Exp Spare Rim Carrier
CARRY TWO SPARES AND BE SAFE



HY-POWER TIMER

For Ford Cars, Ford Trucks
and Fordson Tractors

Outlasts Four Ordinary Timers

Price \$1.50

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MAGNETOS

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GUARANTEED TIRES, TUBES AND ACCESSORIES
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DOUGLAS CORD and FABRIC and HOMESTEAD TIRES

Get Acquainted With GASKO CEMENT

Write today

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All motorists are. Be the one to cash in on this. Exclusive territory to energetic sellers. Rapidly repeated fat profits. Little effort. City plate fastens to license tag with patent never-loosen spring clamp. Write for agency today.

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Established 1901

Welding Since 1910

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Oxy-Acetylene Welding

Your Hardest Jobs Solicited on Aluminum Crank Cases, Cylinder Block Case Units and Tractor Parts. We Do Welding for Other Shops—Let Us Help You.

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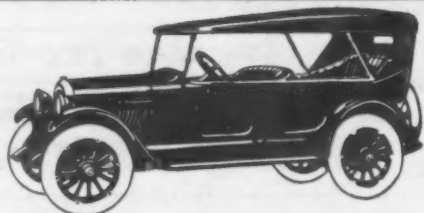
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DRAGON Batteries, by the wonderful service they give, have helped distributors in all parts of the country to make real money and build a big business. They can do the same for you.

The Dragon is unsurpassed in quality. Our distributors proposition is the best you have ever been offered.

Write or wire today.

Englert Manufacturing Co.,
Dept. 200 **Pittsburgh, Pa.**

PARKER VISES



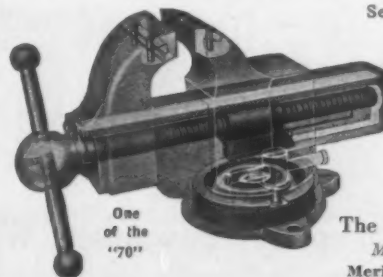
**The Handle
Will
"Stay Put"**

They Grip Like a Grizzly

Parker Superior Vises have a spring in the handle that prevents it from sliding down its full length with a bang, every time it is used.

It stays just where the mechanic leaves it,—and is mighty handy.

Such practical improvements appeal strongly to practical garage men, and explain why Parker Vises are found in the busiest service stations.



One
of the
"70"

The Charles Parker Co.
Master Vise Makers
Meriden, Conn., U. S. A.

Send for Folder No. 9

It describes and illustrates several other Parker Features.

Paige Adopts Cooper "SPECIAL" CUTOUT

PAIGE-DETROIT

MOTOR CAR COMPANY

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DETROIT, MICH., U.S.A.

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W. A. WHITELER, Vice President, Sales Division
HENRY BROOKS, Vice President, Purchasing Division
T. BRADLEY, Vice President, Engineering Division
A. BACHLE, Vice President, Engineering Division

PLEASE REPLY
ATTENTION OF G. C. Vather

December 27, 1921

The Cooper Manufacturing Company
Marshalltown, Iowa

(Attention of Mr. H. M. Cooper)

Gentlemen:

We have your letter dated December 19, regarding Cooper cutout valve which we are using as standard equipment on our Daytona Model.

We selected your cutout after having tried a number of other makes, as we found your product to be very satisfactory for our purpose.

After being in production for a period of about ten months we are still waiting to hear of our first complaint from users and we will continue to use Cooper cutouts in preference to all others, as long as this condition exists.

Very truly yours,

PAIGE-DETROIT MOTOR CAR COMPANY

G. C. Vather
Chief Engineer

GCM/WCH

Cooper Special Cut-Out

Cooper Special Cut Out gives you the loud, strong blast needed to blow out carbon, detect missing spark plugs and other motor trouble. Extra heavy construction. Guaranteed not to "chatter." Not necessary to cut exhaust pipe in two when installing—just an oblong hole, and fit Cut Out around it.

PRICES

Size, 1 1/2 in. Ford Size.	
Valve only	Dash control
\$2.50	\$5.00
Size, 1 1/2, 1 3/4, 1 1/2	
Valve only	Dash control
\$3.00	\$5.50
Size 2, 2 1/2	
Valve only	Dash control
\$3.50	\$6.00
Size 2 1/4, 2 1/2, 2 3/4, 2 1/2	
Valve only	Dash control
\$4.00	\$6.50
Size 2 1/2, 2 3/4, 3	
Valve only	Dash control
\$5.00	\$7.50

Ask your dealer. Dealer write jobber or us.

Manufactured by

Cooper Mfg. Company

Dept. A

Marshalltown, Iowa

The Fulton Company, Milwaukee, Wis.

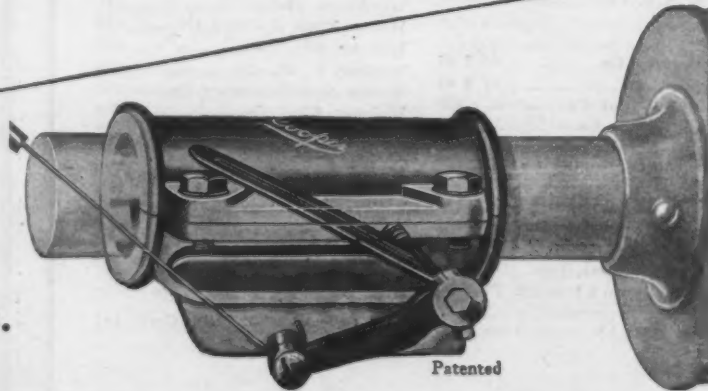
Sales Representatives



Cooper
Dash
Control

for controlling cut outs, exhaust heaters, etc., beautifully nickel-plated, installed by drilling half inch hole in dash. Operated by pulling on the "T" handle and locking it in any position by a slight twist of the wrist. Places the control where it belongs. No interference with floor boards or levers.

**PRICE,
\$2.50**



Patented

Results tell the tale



A perfectly made piston ring, equally efficient for compression and oil troubles, with an oil-sealing, oil-controlling channel, the only one with outlets to release excess oil, preventing clogging. The "self-seating" surface fits itself to out-of-round cylinders. Three rings are installed on each piston.

Pleased Owners and More Profits

In furnishing piston rings for replacement purposes, the greatest profits result from rendering entirely satisfactory service. For satisfied customers will spread the story of the treatment that pleases them, thus adding new customers to your list.

Garages, dealers and repair men everywhere are finding out more and more every day that TELL-TALE Rings invariably produce complete satisfaction.

There are three big reasons:

1—TELL-TALE Rings are oil sealing. The oil film retained in the oil channel seals in compression.

2—TELL-TALE Rings stop oil pumping. They have the only oil chan-

nel with outlets to prevent clogging and carbonizing.

3—TELL-TALE Rings are self-seating. They wear in to fit out-of-round cylinders in less than 100 miles of running.

75c since April 1—send for folder

Additional profits may be made by catering to those owners who demand a more moderate-priced ring. The St. Louis KWIK-SEAT Piston Ring retails at 50c. Here is a splendid quality ring which has the same self-seating feature that has made the TELL-TALE Piston Ring so popular.



Write for Literature and Discounts

Complete descriptive folders on both rings will be sent upon request. Address the factory or the nearest distributor listed below. Good discounts to dealers and repair shops. Also a very attractive Service Station proposition for responsible dealers who will carry a small assorted stock.

St. Louis Piston Ring Corp.

1818 N. 2nd St., St. Louis, Mo.

Chicago Sales Office: 2121 S. Michigan Ave.

Principal U. S. Distributors

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Acme Piston Ring Co.
2121 S. Michigan Ave., Chicago, Ill.
Bearings Specialty Co.
160 Massachusetts Ave., Boston, Mass.
Frank W. Wood Co.
70 West New York St., Indianapolis, Ind.

Lynskey, Neal and Lynskey
3302 Bigelow Blvd., Pittsburgh, Pa.
The Standard Metal Goods Co.
2080 E. 30th St., Cleveland, Ohio
The Miller-Wiegand Co.
217 E. Main St., Dayton, Ohio
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170 King St., West, Toronto, Ontario, Canada.

TELL-TALE

TRADE MARK

PISTON RINGS

America's Blue Ribbon Sport Car

The HAYNES 75 SPEEDSTER



A blue ribbon attached to the steering wheel of the Haynes 75 Speedster identifies the Speedster as America's blue ribbon sport car that is capable of attaining seventy-five miles an hour. The blue ribbon is fastened to the Haynes 75 Speedster when it is shipped from the factory, and signifies that the car has been thoroughly inspected and tested. It certifies, too, that the Haynes 75 Speedster is similar in every respect to the Speedster which was tested by Howard Wilcox in his famous run.

"On Thursday, March 9, 1922, I drove a strictly stock Haynes 75 Speedster over the Indianapolis Motor Speedway course at Indianapolis, Indiana. I attained speeds ranging from seventy-four (74) to eighty (80) miles an hour. The speeds were clocked officially by the Indianapolis Motor Speedway electric timing machine. In my opinion, the Haynes-built 75 six cylinder engine is a remarkable stock motor. It has the necessary speed, stamina and get-away to meet the requirements of the most exacting motorist, and at topmost speed it showed a decided lack of motor vibration. It is the sturdiest and fastest stock sport car I have ever driven to date." (Signed) "Howdy" WILCOX.



Howard Wilcox, internationally known racing driver and winner of the Indianapolis Motor Speedway International 500-mile classic. Mr. Wilcox has driven many leading racing cars of foreign manufacture, and several of the finest American stock cars, in tests and races.

POWER, BALANCE, SPEED—a Mile in 48 Seconds

When Howard Wilcox established the performance record for the strictly stock Haynes 75 Speedster, he demonstrated the worth of the high quality of steels and other materials used in the manufacture of this fast sport car.

The mechanical reasons which enabled Mr. Wilcox to attain an average speed of seventy-five miles an hour, are the same which give any owner of a Haynes 75 Speedster dominance on the road.

With a car of such phenomenal power and stamina, only a very small portion of its capacity is employed in ordinary driving. This means that the Haynes 75 blue ribbon Speedster will give

more satisfactory service for a greater number of years than the car whose maximum power is required for every day's use.

The liberal use of tested steels and drop forgings makes this car safe at the high speeds the Haynes 75 blue ribbon Speedster will naturally be driven by its enthusiastic owner. The blue ribbon award for speed, stamina, power, reliability and endurance, to the Haynes 75 Speedster, is a fitting tribute to the famous Haynes engi-

neers who alone have the distinction and honor of designing and perfecting automobiles for more than a quarter of a century.

The Haynes 75 blue ribbon Speedster is a strikingly beautiful car in appearance; its owners are deservedly proud of it.

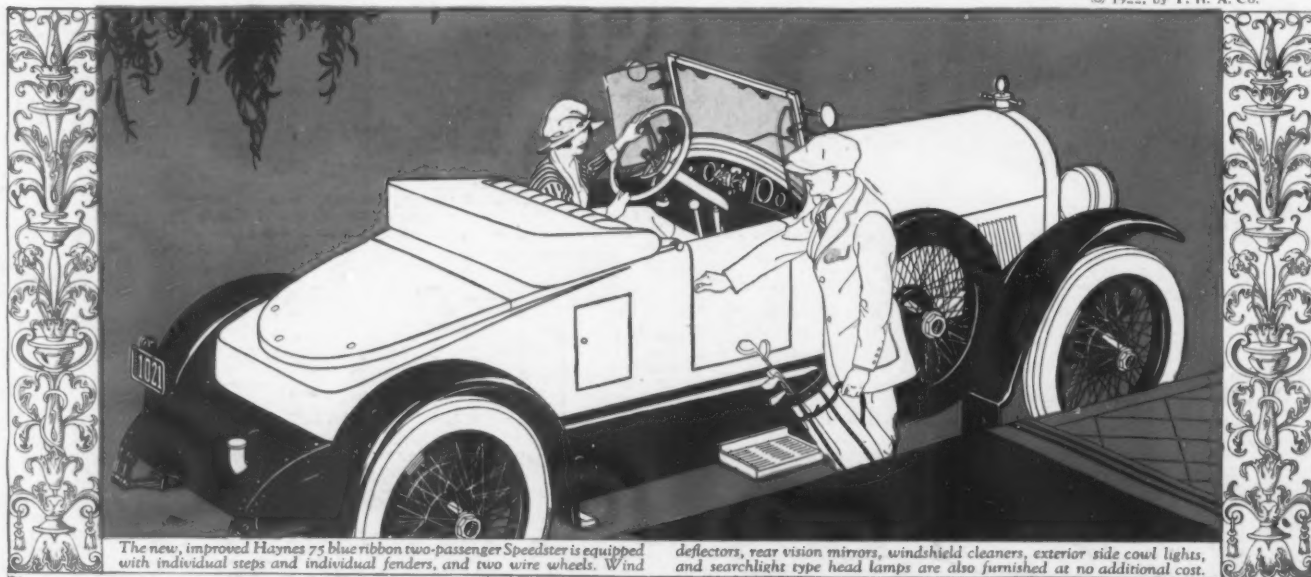
In its class it may unhesitatingly be said to be the greatest value possible. Its excellence is typical of the whole Haynes series. These cars, and the good territories still open for Haynes representation, offer rare opportunities for the dealer who wants success in 1922. Write, telephone or wire for appointment in confidence. In writing or wiring address Dept. 553.

\$2395

F. O. B. FACTORY

THE HAYNES AUTOMOBILE COMPANY, Kokomo, Indiana • EXPORT OFFICE: 1715 Broadway, New York City, U. S. A.

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The new, improved Haynes 75 blue ribbon two-passenger Speedster is equipped with individual steps and individual fenders, and two wire wheels. Wind

deflectors, rear vision mirrors, windshield cleaners, exterior side cowl lights, and searchlight type head lamps are also furnished at no additional cost.